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JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION

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RESEARCH AND POLICY*

By E. A. Goldenweiser

Research in a policy-making body is for the purpose of shaping policy. It is the function of the research staff of such an organization to formulate policy, while the responsibility of the executives of the institution is to adopt or reject it. The executives must choose their research man, must back him while he works with them, and let him go when they can back him no longer. This does not mean that they must always follow his advice: they may modify it, or reject it, without interfering with a satisfactory working relationship, but they must have confidence in his competence and integrity; when they lose that the partnership must be dissolved.

This doctrine—stated baldly—may sound novel. It was not so long ago that a line was drawn between research and policy making: research was supposed to deal with facts alone, laboriously compiled, noncommittally presented, with interpretation restricted to indicating the technical limitations of the evidence. Such an extreme view of the limits of the research function could not be and in practice never was enforced. But even its theoretical acceptance had bad effects. It discouraged responsible thinking in the research man, who needs all that he can muster, and encouraged the dangerous but time-honored habit among executives of making decisions on the basis of practical experience, horse sense, or some other euphemism for hunches or smokeroom gossip. Practical policy in order to be sound must be based on technically competent analysis of available facts, leavened by imagination and activated by courage. These are indispensable to the proper weighing of responsible decisions.

Participation in the formulation of vital policies is the lifeblood of constructive thinking. An intellectual eunuch, incapable of experiencing the agony and thrill of vital decisions, cannot be an effective interpreting economist or statistician. This function requires a redblooded person full of energy and creative endeavor.

* This paper is in lieu of the customary Presidential Address, no Annual Meeting of the American Statistical Association having been held in 1943.

The whole is greater than the sum of its parts.—During the past quarter century the relationship between the research staff and the executive has developed markedly in the right direction. It has made particularly rapid strides during the war when tradition and prerogative have had to give way to accomplishment. There are, however, inherent difficulties in the relationship. Executives, even when they are not political appointees, are likely to be drawn from among men who have had much experience in successfully running their private businesses and little experience in public affairs. They have self-confidence based on their success, and the best among them have qualities of decisiveness and leadership. They are likely, however, to lack sufficient appreciation of the importance of basing national policies on broader grounds than individual experiences. There is real danger in experience. It often results in narrowing a public man's approach to national problems to considerations with which he has become familiar in a particular and often not a representative set of circumstances. He finds it difficult to grasp the fundamental truth that in the national economy the whole is far greater than the sum of all its parts.

In the business world there has developed over the years a set of standards which have been tested by experience and found to be effective, particularly in highly competitive local enterprises. These standards are a part of a philosophy the basic tenet of which is that profit is the test of success. They are less applicable to nation-wide organizations, whose success depends on sustained national prosperity, and are generally inapplicable in public service, where the test of success is the public welfare. It is difficult for an executive who steps from private into public service promptly to discard habits of thought that have brought success in the past and to substitute for them the entirely different standards appropriate to his new responsibilities. Directly and indirectly, sometimes bluntly and sometimes subtly, this conflict of standards is a serious obstacle to effective cooperation between the executive and the staff adviser.

Sound theory is sound practice.—But the difficulties confronting the staff man are not all outside of himself. He is likely not to have had many occasions to make important decisions. In most cases he has not learned by hard experience the difference between logical deductions and motivating forces. Basically there is no difference between sound theory and good practice. Both must take into account all relevant factors and their mutual relationships. The apparent difference between the two rests on the fact that, while both are apt to overlook important considerations, those overlooked by one are likely to be different from those overlooked by the other. The theorist, for example, is likely to disregard human factors, while the practical man is prone

to underestimate or not to recognize potent but unfamiliar objective influences. It must be the endeavor of the professional interpreter to grasp the force of the human equation, to make proper allowance for subjective friction in the derivation of motivating forces, just as the executive must learn to measure and evaluate the objective forces at work.

Clarity is not a vice.—The staff man must learn to recognize his own limitations and those of his data. For one thing, facts by their very nature record the past, while decisions relate to the future. For another, the professional jargon that inevitably develops in any much-explored subject is likely to be unfamiliar to anyone outside of the clan. The masonic grip of the economist should be reserved for use within the lodge and should not be introduced into the council chamber. The neophyte sometimes thinks that abstruse terminology is a necessary part of professional competence. As a matter of fact, more often than not it is merely an affectation, a bad habit, which covers up undigested thought. Frequently it is a substitute for clear thinking rather than a means of implementing it. Clear understanding, a thought-out grasp of a problem, can nearly always find expression in simple, direct, and nontechnical language.

Confusing the foreigner.—Perhaps the clearest and most timely example of confusion created by terminology is in the so-called saving-investment analysis. The basic concepts in this analysis are both simple and true. The theory is that income received by a people must be disbursed again—either for consumption or for capital formation. Otherwise the income withheld will diminish the total income stream and on the next round there will be less income to distribute, and a deflationary spiral is likely to start. This is in substance a sophisticated version of the element of truth contained in the time-honored popular saying that spending is a social virtue since it puts money into circulation. Every student of economics in his freshman year has been taught, and I dare say is still taught in most classrooms, that this doctrine is fallacious. But then, this is not the only thing taught to the freshman that the graduate student finds it necessary to discard or modify. The popular theory, which in its homely garb has been excluded from the elementary classroom, has been caparisoned in brand-new terminology and presented with a flourish to the advanced seminar.

There is nothing inherently complex in this theory. The meaning of the terms saving and investment as used in every-day language is clear enough. A person's savings are that part of his income which he does not spend on consumption, while his investments are the part of his saving which he places in income-producing assets. What matters is whether the aggregate of investment by all individuals and corpora-

tions, after allowance for liquidation of investments wherever it may occur, is sufficient to absorb the aggregate of all savings after allowance for deficits that may be incurred by some. If it is not sufficient, there will be a remnant of national hoarding, which will exert a deflationary drag and force income to a lower level. Emphasis on the term national hoarding as the crucial point in the picture would be helpful; it is almost self-explanatory and convincing, because hoarding is generally recognized as a reprehensible habit, while most people are brought up to believe that thrift is a noble virtue.

But the economist as a rule does not present the problem in such simple terms, understandable to the layman and consistent with his usage. The economist uses much more complex definitions and each group of economists, if not each individual one, uses different definitions. Under the spell of these varying uses of terms, some maintain that the volume of savings must equal that of investments, and others that the two will never be the same. While each set of definitions may be logically consistent and as clear as day to its proponent, the debate moves into a rarified atmosphere where the layman dare not penetrate.

Above all, what makes the doctrine unacceptable to the layman is that it appears to condemn what he knows that he as an individual must practice for self-protection, namely, thrift. He cannot be expected to understand easily that, while thrift is a necessary protection against poverty for the individual, an excess of savings by all may result in causing poverty for the economy as a whole. In that case the individual saver may lose far more through unemployment than he was able to save by the exercise of thrift. Neither can he be expected to keep in mind that what is meant is not investment at all, as the layman understands it, but only the total outlay on capital goods. That the heart of the analysis and the threat to economic stability lie in the relationship between aggregate saving by millions of individuals and aggregate spending for capital goods, called investment, is quite beyond the layman's power to comprehend.

While with a little more effort on the part of the staff man these thoughts could be presented to officials simply and clearly, all too often they are stated in seemingly familiar terms without warning that the terms are not used in their familiar sense. This results at worst in complete misunderstanding and at best in unnecessary confusion. Forcing words with well-established meanings into unaccustomed uses is a good example of what Galsworthy calls (referring to the pronunciation of English names) the sound British custom of confusing the foreigner.

The richer—the poorer.—The saving and investment analysis may also serve to illustrate a danger confronted by staff men far greater than mere terminology, namely, the temptation to depend on a simple

formula for the cure of too many varied economic ills. The saving-investment theorem, stated simply, is a formula which, like the quantity theory of money, is little more than a truism. In fact, the great service that this formula has rendered is to release the economist from his imprisonment within the walls of the equation of exchange. And yet, there is danger that it has only released him from confinement within one formula to imprison him within the terms of another. The great difficulty with the quantity theory was that it was based on faith in the mechanical operation of monetary forces; its proponents believe that the volume of money controls prices, and that by controlling prices one can regulate the entire economy. Emphasis on the income flow, as contrasted to the volume of money, represents progress towards a more realistic approach to economic problems, because it takes account of the behavior of humans. But in applying the new doctrine, as the old, the economist should make allowance for the complexity and mobility of economic forces and be on his guard against placing too much faith in causal relationships between terms of a formula.

In its simplest terms the theory is that, if a part of the national income is hoarded, the income flow diminishes and deflation results. But frequently the argument goes further. From past experience and from the analysis of social trends, some conclude that there is a definite relationship between the size of the national income and the volume of savings which is likely to prevail in future years, a relationship according to which the proportion of income saved will rise as income increases. As our productive capacity and our national income increase, there will be an ever-increasing volume of savings. Also, estimates are made of the avenues of investment which are likely to be available into which these savings can be channelled, and it is found that these outlets do not add up to the required total. Thus national hoarding is an enemy constantly lurking behind the scene and preventing the growth of income which our growing capacity would permit. Consequently our actual income will constantly lag behind our maximum capacity. The higher our potential income, the further will we fall short of utilizing our resources fully, and the greater the probable magnitude of unemployment. The richer we grow the poorer we get in terms of jobs for all. The only way out of this dilemma is then said to be compensatory spending by government. This diagnosis has become an argument for a course of action, an argument fashioned at a time when such a course of action was desirable—and, it may be added, was partially pursued but on an entirely different basis.

There is agreement that national hoarding is not consistent with the realization of the maximum level of economic activity and that, if it occurs, it must be counteracted. However, statistical evidence now

available is not sufficient to be the basis of precise predictions as to the future levels of saving and investment and cannot reflect all social changes which the future may bring. The assumption that savings will be far in excess of investment outlets is a hypothesis and as such it needs to be verified by further research and is subject to modification by accumulated experience. Nothing in the history of similar forecasts in the past justifies the acceptance of the assumption as *the* basis of responsible planning or definitive action.

If people save more as income rises, outlets for their savings must be found. While it is true that past evidence suggests that savings habits do not change easily, there is no satisfactory basis for thinking that changed circumstances, particularly a wider distribution of income and wealth and an increased sense of economic security, may not change the ratio of savings to income. Nor is there a basis for thinking that new outlets for investment or new means of spending larger amounts through old channels will not be found. The amount of possible investment in the future is not dependent entirely upon technical progress. It must be viewed with reference to the entire economic setting in which business operates, including prices, taxes, public controls, employer-employee relationships, and numerous other factors that must be taken into account before the formula will be transmuted from a dead and barren phrase into live reality.

Jobs for all—and goods for all.—A practical approach to the problem would be that, since unemployment must not be tolerated in a modern economy, it must be eradicated as soon as signs of it appear. It must not be permitted to start a vicious cycle. Whether this will involve much action by the Government will remain the great unknown in the equation. Certainly, compensatory fiscal policy will be only one among many approaches which public policy will have to make towards maintaining a high and stable level of economic activity. Yet, there can be no doubt that the Government must stand ready to provide such employment as private industry does not supply, and with this in view, it must have plans developed in advance and ready to be put into operation on short notice.

One thing is sure: we do not as yet approach a volume of production sufficient to give everyone a decent minimum standard. Therefore, the remedy must be sought not in the contemplation of increased leisure, but in concentration on efforts to increase the output of goods and to improve their distribution.

This somewhat lengthy detour was introduced to illustrate the kind of pitfalls an interpreting economist must avoid, but in the course of presentation it developed into a statement of a position. Perhaps this

is an unconscious demonstration of how easy it is for an interpreter to be diverted from his original purpose.

Training is a trust.—In addition to avoiding abstruse terminology and inadequately tested formulas, there are other tests to which a staff adviser of a policy-making body must subject himself. He must be sure to gather together, digest, and have command of all available information bearing on the subject under discussion. He must be fully aware of the limitations of this information, of the margin of error to which it is subject. The touchstone of a theory lies in quantitative data, that is, in statistics. Statistics are the economist's conscience. His reliability stands or falls by their verdict. When he disregards them, or misreads them, or improvises them, or stretches them beyond the limits of their capacity—he violates the trust imposed upon him by his training and by his responsibilities.

Policy must rest on forecasts.—The staff man must ponder and comprehend the full import and implications of the problems confronting his principals and of the policies designed to meet these problems. He must be prepared to venture a forecast of future events in case a given policy or its alternative is adopted. Contrary to a commonly held opinion that research must avoid forecasting as a deadly sin, the basic purpose of economic and statistical analysis of social and economic events is to make forecasts. The French saying—to know, in order to foresee, in order to control (savoir pour prévoir, prévoir pour pouvoir)—is a wise one. Unwarranted forecasts must be avoided, and there must be full recognition of the fact that a forecast is a hypothesis and not a fact. But courage to make as good a forecast as available facts and past experience warrant is an essential quality of effective research staff work.

Biases are sirens.—In presenting data to his principals the staff man must avoid a great variety of biases which like sirens tempt to lure him from the journey to his goal. Some of them may be enumerated:

1. The bias of pessimism or optimism. What he says should not be influenced by fearful apprehension or by wishful thinking. He must endeavor to face and appraise the facts no matter where they may lead.

2. The bias of no bias. This somewhat paradoxical bias is both real and common. An excessive effort at being impartial often results in shrinking away from indicated and necessary conclusions. "Yes and no" answers should have no place in a staff man's vocabulary.

3. The bias of accuracy. Accuracy beyond the requirements of the case under discussion may not only delay decisions, confuse the listeners, and burden them with unnecessary qualification, but it may also prevent the reaching of necessary conclusions within the applicable margin

of error. Careful abidance within this margin, on the one hand, and willingness to venture to the limits permitted by it, on the other, are the outstanding characteristics of the expert as contrasted with the amateur in economic interpretation.

4. The bias of consistency. Just because he has said one thing on a previous occasion the staff man should not hesitate to say the opposite if circumstances have changed or if he has become convinced that he was wrong. Many serious mistakes have been made by basing decisions on conditions that no longer prevailed. Winning the last rather than the current war is a habit not confined to generals. Consistency is not only the bugaboo of small minds but the rock on which essential flexibility of policy may shatter. Vested interest in an opinion previously expressed is as dangerous in a staff man as vested property interests are in a judge or legislator.

5. The bias of cleverness. The Russian proverb: "Do not sacrifice your father for a wisecrack" is well turned. Phrases help to punctuate a presentation and to fasten it in the listeners' minds. But they carry a danger of sacrificing clear and straight thinking to the desire to use a telling phrase.

6. The bias of tact. It is essential for a staff man to be sensitive to the atmosphere of a meeting, but he must endeavor not to be dominated by it to the detriment of detachment in his presentation. On the other hand, he should avoid egotism and be willing to give equal weight to a competent judgment, whether it originates with him or with someone else.

7. The bias of logic. Not infrequently a conclusion that flows logically from its premises may nevertheless be wrong—either because the premises have not been adequately examined or because the process of reasoning is too rarified for use in practical affairs. The human equation must be taken into account in all policy recommendations.

8. The bias of originality. Better be right in a conventional way than wrong in a highly original way.

9. The bias of expertness. Methods and devices are no better than the material and the understanding that go into them. Uncritical curve reading is as dangerous to sound conclusions as is a disregard of the sequence of past events. Particularly dangerous are curves that have been corrected, by some device, for the very thing which they are supposed to exhibit. It is not an unusual experience to see an interpreter, who has adjusted two curves for amplitude and direction of fluctuations and for level, stand back and marvel at their close correlation.

10. The bias of omniscience, the gravest of them all. Some principals expect a staff man to know everything, and staff men are likely to dread

admitting that there is something they do not know. It is wise, and it is a part of the job, to know as much as possible about all phases of the subject under discussion. It would not do not to know, or not to be in a position quickly to find out, too many of the ascertainable relevant facts. But neither would it do not to be willing to say "I don't know." Attempts at covering up gaps in his information by more or less hazardous guesses have rightly undermined many a staff man's reputation for reliability.

Importance of being awake.—It has been said that an expert is a person who knows more and more about less and less. The danger that confronts an economic and statistical interpreter is the opposite—he must strive against knowing less and less about more and more. The subjects he must cover tend to comprise the universe. It is essential for him to keep informed about a great many things but not to spread himself so thin as not to know enough about anything to be a dependable guide to policy.

These are some of the biases and difficulties that a staff man must avoid. There are many others. It is clear that he cannot proceed in the rumored manner of a duke who dreamed that he was making a speech in the House of Lords, and when he awoke found to his amazement that he was. He must not be either too self-confident or too reticent; he must be tactful but not timid; and, above all, he must never be subservient. When a staff man begins to shape his opinions in accordance with what he thinks his principals want his usefulness as a public servant is over.

The anvil chorus.—In attempting to acquire the necessary virtues and to avoid the threatening vices a research man has to depend, in addition to searching self-analysis, on contact with his associates and with fellow members of the profession inside and outside of his immediate group. In the final analysis man is dominated largely by the subconscious. Since he cannot be psychoanalyzed prior to every presentation—he must take care to subject his psyche to exposure to others. Out of such contacts alone can emerge a sane appraisal of human problems. And problems of economic policy are human problems whose solution depends on grasping human verities.

THE STATISTICAL PROGRAM OF THE SELECTIVE SERVICE SYSTEM

By Kenneth H. McGill
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Selective Service System

When reference is made to the statistical program of the Selective Service System, it means the effort of National Headquarters to perform a complete statistical service for itself and for the 52 state and territorial headquarters and the 6,441 local boards which comprise the field organization. The operation of the System is entirely decentralized and statistical information is an important medium for coordinating units which are widely separated in time and space.

Under the Selective Training and Service Act of 1940, as amended, the System is charged first of all with the orderly withdrawal of men from civilian life and industrial pursuits for duty with the armed forces.[1] Its statistical program is aimed at supplying the information necessary to this task.

Since data for the planning and operation of the System must be furnished on each local board and also to that board, by far the greater part of the statistical program is devoted to reporting activities. The boards forward to National Headquarters information on the Selective Service classification and the age, race, marital-dependency status, occupation, education, physical, and other characteristics of each registrant. From such information the Research and Statistics Division prepares individual punch cards and provides the following periodic tabulations for each board:

(1) Monthly Report of Classifications by race and marital-dependency status.
(2) Quarterly Report of Classification Actions by race and marital-dependency status.
(3) Annual Report of Principal Defects of Accepted and Rejected Registrants by race.
(4) Annual Report of Occupations of Accepted and Rejected Registrants by industry.

The first two tables cover all registrants within the ages acceptable for induction into the armed forces, but the third and fourth are based on a sample of the men who are given physical examinations at local boards and induction stations. State and national recapitulations of

[1] In addition to the procurement of military manpower, the System is charged with the reemployment of men at the termination of their service with the armed forces.

these local board materials are made along with the special tabulations which are needed.

Equal to the reporting work in importance, though not in magnitude, is the analytical part of the statistical program. This technical phase is concerned with (1) the development of estimates and (2) the accomplishment of research. Both cover a wide range of subjects. An example of the former is an estimate made last July that if induction calls were completely filled during the period July through December 1943, around 446,000 Pre-Pearl Harbor fathers would have to be inducted after October 1. One of the latter is Medical Statistics Bulletin No. 2.

FIELDS

The work of the Selective Service System may be regarded as consisting of three processes: (1) the basic manpower process of registering men and classifying them according to group characteristics, (2) the concomitant one of the occupational or other deferment of men in order that there shall be the least interruption to economic and social life, and (3) the other inherent process of the physical examination for induction or rejection of those not deferred. The reporting and the analytical phases of the statistical program follow this pattern as far as subject matter is concerned. They have their manpower, occupational, and medical aspects and by the time the whole task of Selective Service has been accomplished, each field will have had a period of dominant importance.

The Selective Training and Service Act became effective on September 16, 1940; the first registration[2] under the law was on October 16; and the first induction of a registrant into the armed forces was on November 18. From then until Pearl Harbor and the entrance of the United States into war[3] the calls of the armed forces for men for induction were relatively small.[4] The Army which Selective Service was helping to build was limited by law to a net strength of 900,000 and by appropriation to 800,000. This peacetime era of Selective Service can, therefore, be viewed as one when medical statistics were of dominating interest and usefulness.

The physical, mental, moral, and educational standards of induction were aimed at the very best type of soldier available, and to determine which registrants qualified under these standards, both local board physicians and the medical staffs of induction stations were performing thorough examinations. The combined rejection rate for local

[2] Around 17,000,000 men between the ages of 21 and 36 years.
[3] December 8, 1941.
[4] The average was but 81,000 per month during the entire calendar year of 1941.

boards and induction stations was as much as one-half of the young, single men who made up the vast majority of the selectees examined.

So rigid an application of such high standards was accompanied by differences of determination upon physical examination. The effort of Selective Service, therefore, was toward (1) standardizing local board examination procedures, (2) attaining uniformity from board to board in the results of examinations, and (3) studying and achieving the maximum realization for military service if existing standards were applied to all men of the first and second registrations.[5]

Following Pearl Harbor manpower information became the dominating field of the statistical program. The induction calls upon Selective Service increased from 22,000 in December 1941 to 450,000 in December 1942, or approximately twenty times during a one-year period. In addition the outside limit of the armed forces grew more than tenfold and the responsibilities of the United States as an arsenal of democracy expanded accordingly.

Then on January 1, 1942, a month after Pearl Harbor, local boards were directed to confine their physical examination activities entirely to the detection of venereal disease and 141 manifestly disqualifying defects. The induction stations were to assume the sole responsibility for the thorough examination which both boards and stations had previously been performing.

Later the third, fifth, and sixth registrations, held respectively on February 16, 1942, June 30, 1942, and in December 1942 and following, added 12,000,000 militarily liable registrants.[6] This together with the 18,000,000 of the first and second registrations made a total of 30,000,000 men between the ages of 18 and 45 years who were liable for service with the armed forces. Early in December of 1942, however, the armed forces terminated the induction of men aged 38 and over. This reduced the military manpower pool to 22,000,000 of the ages 18 through 37.

While these factors served to increase the demand for medical data, they also developed the need for information on classification, occupation and dependency at a much more rapid rate. As the competition of the armed forces, the manufacturing industries, and agriculture for men has become keener so has the need for this kind of manpower data.

[5] The second registration was held on July 1, 1941, and covered approximately 800,000 men who had become 21 years old since the first registration.

[6] A fourth registration was held on April 27, 1942, and covered 14,000,000 nonliable men aged 45 to 65 years. The third registration covered 8,000,000 aged 20, 21, and 37 through 44; the fifth 3,000,000 aged 18, 19, and 20; and the sixth, those 18 year olds who were unregistered in December 1942 and those who attained that age thereafter.

The demand for it will probably continue until the maximum strength of the Army and Navy has been reached.

When the war is over and military demobilization is in progress, the emphasis of Selective Service statistics will be on occupational data. As has already been mentioned, the System must not only procure men for the armed forces, but it is charged with the responsibility of finding employment for each man and woman released from service when they are physically qualified for work.

DEVELOPMENT

Developmentally speaking, the statistical program of the Selective Service System got under way in the fall of 1941. National and State Headquarters and local boards had been engaged in some statistical work since the first registration.

One item of the early work provided a limited amount of information for planning and operating purposes. This was a monthly report on the Selective Service classifications of registrants by race, which was prepared by the local boards themselves and forwarded to State and National Headquarters. It was in operation intermittently from March 1941 through June 1942, a little over a year. Problems of (1) adequacy, (2) comparability, (3) flexibility, (4) accuracy, (5) promptness, and the like served to discourage the use of this summary type of reporting. As a result a decision was made in the summer of 1941 to develop a system of individual punch card records on each registrant, to have these cards available at National Headquarters, and to produce such data from them as were required both routinely and specially for the entire System. In arriving at this determination National Headquarters held extended consultations with a statistical advisory committee, the staff of the Division of Statistical Standards in the Bureau of the Budget, and other specialists in the field.

Following the decision to abandon the summary report approach, the Division of Research and Statistics at National Headquarters was reorganized into (1) a divisional office, (2) an analytical branch with medical, occupational, and manpower sections to cover the three major aspects of Selective Service, and (3) a tabulating branch with machine, manual, and control sections. The task of the new division was to arrange for securing, processing, and utilizing a statistical record on each of the eighteen million men then registered. It must not only maintain a basic file on every man but it must also keep such record current at least with reference to the registrant's Selective Service classification.

The magnitude of this program and its continuing time factor offered

a peculiar challenge. Although it appeared to be unique among statistical activities, those charged with its development began to explore their own experience for methods of accomplishment. This staff had been drawn from the Public Health Service, the Department of Agriculture, the Work Projects Administration, various college faculties, the War Department, the Social Security Board, the Bureau of the Census, the Bureau of Employment Security, and other Federal Agencies. Its advisory committee, which had also been enlarged and reconstituted, came from equally varied sources.

There began the technical planning of the project. Should this continuing central inventory, which Selective Service System was establishing, use somewhat the same techniques as the mechanical reporting system for venereal diseases developed by the Public Health Service? What were the related procedures used in the National Health Inventory of five million cases? Did the accounting system of the Agriculture Adjustment Administration have applicable elements? Were there similarities between the records program of the Social Security Board and the reporting activity of Selective Service? What of the periodic reports of the Work Projects Administration, the individual files on Army men at The Adjutant General's Office, the work of the decennial Censuses, and the information set-up of the Employment Security Bureau?

From what registrant records should the basic punch cards be prepared? How would changes of status be secured to keep them current at least as to Selective Service classification? What techniques would merge these changes with the basic record in the most expedient and efficient manner?

In the fall of 1941, which is the time the individual records approach was being developed, National Headquarters was receiving a copy through State Headquarters of but one report on the registrant. This was his *Report of Physical Examination and Induction* which was prepared on each registrant placed in Class I for induction processing. The advantage of this form for statistical purposes lies in the fact that it is almost entirely filled out by the examining physician and the local board clerk, whereas most registrant records are prepared entirely by the man himself. To provide information on the physical and mental defects of registrants examined under the existing high standards, punch card processing was immediately begun on a sample of these forms.[7]

Obviously this medical reporting form would be available only for physically examined men and at that early date not many more than

[7] For additional discussion of the medical statistics work, reference is made to Folk, O. H., "Selective Service's Medical Statistics Program," this JOURNAL, December 1942, Vol. 37, pp. 425–429.

three of the eighteen million had been so processed. The only other sources of information on registrants who had not yet been physically examined were in their local boards. The processing to which local boards subject them, was, therefore, reviewed and all of the various data by-products were considered.

When a man registers, his board prepares and files a *Registration Card* for him, but this record does not contain enough information to provide an adequate basic punch card for a central reporting system and besides there is but one copy of the form.

Next, the board serializes the registration cards and lists them by serial number for the purpose of assigning order numbers. This *List of Registrants* is likewise inadequate for use in preparing a punch card but it offers a reference covering all registrants. In addition, copies are available in both the boards and State Headquarters. National Headquarters, therefore, secured copies for the first and second registrants; and, following Pearl Harbor, arrangements were made for them to be submitted routinely as the third, fourth, fifth, and sixth registrations were held.

After a registrant is given an order number, he is sent and must prepare and return a classification form known as the *Selective Service Questionnaire.* This form contains information adequate in scope for a basic record, and just before Pearl Harbor, National Headquarters was about to request local boards to prepare precoded abstracts of each of these classification questionnaires.

When the United States entered the war, however, it became evident that Selective Service must undertake an occupational inventory of its forty-four million registrants. This inventory was conducted by means of a *Selective Service Occupational Questionnaire* which each registrant filled out for his local board. A part of this form was detached by the board and forwarded to National Headquarters for punch card processing. The problem of a basic individual record had, after a fashion, been solved.

From this material came tabulations on (1) the selected occupations or critical and essential skills of registrants by region, state, and industrial area and (2) on Selective Service class and marital-dependency status by state and local board. The former were used by Selective Service in connection with its occupational deferment activities and also by other federal and state agencies concerned with problems of manpower. The latter were applied by Selective Service as a more specific basis for the state and local board allocation of calls which were made upon it for men to be inducted into military service.

The Selective Service System now had an individual medical punch

card for a sample of physically examined registrants and a second punch card record for almost every registrant[8] covering his other characteristics, such as, Selective Service class, age, race, marital status, dependency, education, work status, employment class, selected occupation, etc. This had been accomplished without material interruption to the entire operation of the System, an important matter in connection with as rapid and as extensive a program as that of Selective Service. In other words the collection of data from the field and its return to the field in tabulated form had been developed as an integral part of the whole operation.

It still lacked one item, however, of performing the task for which it was created. This was the all important one of current information on the registrant's latest Selective Service classification about which the entire effort of allocating and meeting calls is organized. The classification process is the technique through which the Selective Service System operates to build the armed forces through an orderly withdrawal of men from civilian and industrial activities.

The problem of a registrant's current class was solved by substituting a single form, *Local Board Action Report*, for three forms already in use. The new form served to transmit to National Headquarters, after each local board meeting, the new class assigned to a registrant at that meeting. From this form are tabulated the monthly accountings of registrants by classification, race, and marital-dependency status for the nation, each state, and each local board. It also provides monthly tables showing the classification process by similar units of the System, that is, the classes from which registrants are taken and into which they are placed.

OPERATION

The foregoing on the development of the statistical program of the Selective Service System may have given some indication that the operation of this program involves many problems. The System had been functioning for more than a year and using statistical information in its work. National and State Headquarters and local boards were interested in having new and more comprehensive data.

Special requests for operational and planning statistics began to arrive in quantity. After Pearl Harbor they increased greatly in proportion and there they have remained. As is always the case with figures that are to be used, the great majority of such requests were accompanied by a deadline. Decisions on policies and procedures can

[8] The Occupational Questionnaire was not prepared by registrants who were already in the armed forces at the time of the survey.

wait only a limited time for data. The statistical activity of the System had to attain production in that respect or become fallow.

The requests from within the System ranged from ascertaining why a given local board was relatively low in the proportion of registrants inducted, to estimating what would be the effect upon the farm, factory, and fighting front if the induction of Pre-Pearl Harbor fathers was limited by law to those under 30 years of age.

An ever recurring task has been the study of the defects of men rejected for military service and their prospects for acceptance under actual or proposed changes in physical standards. Since the number of these rejections aged 18 through 37 has now reached 3,500,000 and fathers are being drafted, the importance of the subject has caused Congress to legislate for a five-man medical board to study the physical standards of the Army and Navy. To date most attention has perhaps been given to rejections for educational deficiency, venereal disease, teeth, psychoneurosis, eyes and ears. Regarding syphilis and teeth, considerable progress has been made in getting standards revised for the acceptance of men with these defects.

Naturally studies of the occupations and industries of registrants have always been of concern. Occupational bulletins and lists of deferrable occupations have been issued for the guidance of the System in its deferment work. A constant question has been, under present procedures for occupational deferment, how many farmers and how many factory workers will be deferred in three, six, twelve, or eighteen months. What will the occupations of the latter be? What will the occupations and industries of inducted registrants be for the same periods? How many men will the replacement schedules and manning tables yield for induction and from what part of the industrial and occupational pattern will they come?

Another item which has required continuous attention is that of the most equitable method and data to use in allocating calls for induction among states and local boards. Estimates on the number of men to be secured for the armed forces from the registrants not yet inducted or enlisted have likewise been in constant demand. And when the induction supply of single men without dependents was running low, studies were required on the date when single registrants with collateral dependents would have to be processed. Similar studies were needed when it became apparent that married men with wives only would have to be inducted and also when the same situation developed for registrants with children.

An outstanding example in analytical work is a one per cent sample study of the local board files of the Occupational Questionnaires for the

first registration. This study was made after these registrants had been the subject of Selective Service processing for two years and some of its more pertinent findings were:

(1) One registrant in three was under 26 years of age but more than half of those inducted and enlisted by September 1, 1942, were in this age group.
(2) One-third were unmarried, whereas almost 9 in 10 of those in the armed forces by the end of the second year had this marital status.
(3) Approximately 1 registrant in 9 was a Negro; although only 1 induction in 11 was a Negro, a higher proportion of Negroes than whites had been processed toward induction to obtain even this induction ratio, due to differences in rejection rates.
(4) The heaviest withdrawals through induction or enlistment have been from the less essential occupations such as clerical, sales, and domestic and other service workers.
(5) Approximately 2 in 3 claimed qualifications in one of 190 essential war occupations, but only 1 in 15 of those inducted into the armed forces made such claims.

While these results were obtained from a sample study designed primarily to aid in the operation and planning of Selective Service, certain of the data collected may appeal greatly to research workers. The punch cards contain the registrant's marital status, the number of children reported by him, whether he lived with his dependents or not, the types of schools he had attended and the highest grade completed, the occupation and industry in which he was employed at the time of the Occupational Inventory, and whether or not this occupation was the occupation for which he judged himself to be best fitted.

In addition, the card has such items as qualifications in one of the 191 occupations and 35 professions considered essential to the prosecution of the war, and if qualified, whether the registrant was working at one of them. The study also provides such other data as the number of registrant inmates of institutions; the number unable to work, the number reporting that they did not want to work; and the number working for wages, working independently, neither hiring nor being hired, and working as proprietor or employer. All of these characteristics can be made specific by race, citizenship, age and place of residence.

Special reports on this and similar studies have already been prepared covering the aspects important to Selective Service. As time and opportunity permit, others will be undertaken. They should prove to be an important cross-sectional view of American men in time of war.

Interest in the data and studies of the Selective Service statistical program is not all confined to the System. The materials have been and will be made available outside the organization for manpower studies, for Census estimates, for statistical research, for postwar planning, for

occupational and industrial study, for research in housing, public health, and medicine and for a great variety of other subjects in which Selective Service has the concern but not the facilities for participation.

In addition to the analytical phase of operating the statistical program there has also been the mechanical problem of securing and tabulating the routine reports from the local boards. As has been seen, reporting forms had to be revised or developed to provide a basis for mechanical processing. A manual of instructions for local boards to use in preparing forms had to be issued. Even then employment turnover and other factors among the compensated clerks of the System's 6,441 local boards have caused some interruption in the flow of reports to National Headquarters. A similar situation has existed with reference to the submitting of correct information.

On the other hand State Headquarters and local boards have had limited difficulty in understanding and applying the periodic tables and special materials from National Headquarters. This has occasionally required field attention by the regional officers of Selective Service and members of the Research and Statistics Division. Further, the matter of getting the data reported promptly and accurately has been the occasion for considerable correspondence. In a decentralized operation of 6,441 local units, there is always someone who forgets or who fails to understand.

At the beginning of the individual records work the monthly classification tables for each board, which were prepared from its individual classification reports, were superimposed upon the summary reports previously submitted by the board. This, together with the initial trouble of securing the individual reports on time and correct in detail, made for significant accumulative errors in the tabulations of some boards. A complete inventory of all militarily liable registrants, which the System later undertook, was used to adjust the basic items of Selective Service class, marital-dependency status, and date of birth on the individual punch card at National Headquarters and to complete this file for registrants not covered by the occupational questionnaire. This meant the coding and punching of 30,000,000 additional cases in a relatively short period of time. State Headquarters and local boards had become dependent upon their machine records and could not be kept waiting for their monthly reports.

Operating the tabulating part of the program called for procedures on receiving, controlling, editing, coding, filing, punching, sorting, and tabulating. Many of these and especially the machine processes were innovations. They were designed to fit a particular situation, to handle volume and to attain speed during a period of personnel and equipment

shortage. It might be mentioned, however, that with all the ingenuity exercised on procedures, the tabulative phase might not have been possible of undertaking except that the System was fortunate enough to absorb the staff and machinery—900 employees and 20 tabulators—of a processing unit of the Work Projects Administration.

Because of the intensive application of personnel and equipment and the changing character of the Selective Service program, no statistical procedure designed to serve it can remain fixed for any great length of time. The Selective Service process is a dynamic one. Since Pearl Harbor it has been under constant pressure from the war with the enemy abroad and the drive for food and manufactured goods at home and has been in a state of continual adjustment with reference to these three factors. In consequence, the statistical work of the System is also dynamic in character.

THE SOCIAL VALUE OF AGRICULTURAL STATISTICS

By Walter H. Ebling
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Less than one-fourth of the American people now live on farms compared with about three-fourths a century ago. As the bulk of the population is now removed from the land, it necessarily has become more dependent for its food and fiber upon that portion which remains on the farms. In time of peace and the usual agricultural abundance, we take our food supply as a matter of course, and our urbanization and specialization are looked upon as evidence of progress. In wartime when some basic items become scarce, many begin to worry as to whether there will be enough to go around, and they read with a new interest the reports on crops and the prospects for farm production. Citizens know that our food rationing and point values must have a statistical base, and that data on farm production and on stocks of food products are basic to plans and programs concerning such commodities.

So in our modern world the data on agriculture, like agriculture itself, are basic to our thinking as well as to the controls exercised over things we use. Just as a continued and dependable flow of food and fiber from the Nation's farms is vital to our way of life, so a continuing knowledge of the ever-changing prospects in the many-sided farming industry is a matter of public concern. Except for their greater intensity in wartime, the social interests in agricultural data during such disturbed periods are also those of peacetime: their use in government, in commerce and industry, in the press, in schools, and by agricultural leadership being perhaps the most commonly known. While only a small percentage of the population makes direct use of agricultural statistics, all are affected by them daily.

I

Statistically, agriculture presents an extremely varied universe, even when looked at from the standpoint of a single state as well as when considered for the United States as a whole. According to the last census, this country had over 6 million farms, each of which is an individual unit subject to various degrees of control by the operator, as well as subject to many changes arising out of natural forces which are largely beyond the operator's control. Not only are there a great many individual producing units, but they are scattered widely over the 48 states. This introduces the whole range of geographic and economic

patterns, which complicates immensely the task of measuring quickly both the short and long-time changes in this far-flung industry.

After the basic levels of the farm inventory and output are established periodically by enumeration or other means, measurement of change from these levels is a continuing process. Some of the changes in agriculture are slow, while others are rapid and unpredictable. In whatever way these changes are measured, the problem is always a vast one and much more difficult than the measurement of changes in the concentrated units found in most other industries. To record at one time the output changes for a group of mills or mines is a simpler task than for a vibratory biological universe made up of more than 6 million unlike and widely scattered farms, most of which produce many kinds of products.

The types of data needed on agriculture are many. This country officially undertakes to keep track of the acreages and the production of over 80 crops, as well as of the numbers and output of the various species of animals and the production of animal products. It is not enough to know what the past and present supply situations are, but measures of prospective production and of probable future supplies are also of great importance. After all, the total supply of food, fiber, and other things from the farms is made up of quantities carried over from the past as well as those available from present production; and the adequacy of current supplies is in large part determined by the prospects for the visible future. In addition to the question of supply of farm products, there are increasing needs for data on prices, wages of farm labor and other costs, land values, and various other items that may reflect the industry's changes, capacity, and outlook. The measurement of all of these at regular intervals, year in and year out, presents one of the large fields in statistics, and one in which the public interest, while always present, is intensified during wartime or other periods of unusual disturbances such as depression years. Agriculture is not only a source of supply, but an important market for the products of other industries, and the buying power of farmers is at all times important to the national economy.

Because there is this wide public interest in basic data on agriculture, the collection of such material became a government responsibility long ago. Such data can have both proper and improper uses and the public interest requires that they be impartially collected and dependably interpreted.[1]

[1] In the first monthly crop report of the United States Department of Agriculture on July 10, 1863, Isaac Newton, the Commissioner of Agriculture, wrote "Those who produce and those who consume have interests as well as the purchaser who stands between them. A knowledge of the market is essential to all . . . "

II

Attempts to compile agricultural statistics go back more than a century into American history, and farther in Europe. In the United States, an agricultural enumeration was included for the first time in the Census of 1840 after a period of agitation for an inventory of the resources of the United States, of which agriculture was at that time perhaps the major one. A unique book by Archibald Russell[2] in 1839 summarized this early thinking and urged a program, which it took decades to accomplish. Such an undertaking was also suggested in the President's message to Congress in 1838.[3] Russell's volume was prophetic of things to come.[4] The author of the book realized that before studies of the economy could be made, primary data had to be collected, and it was his purpose to advocate a broad program of agricultural data, only a part of which was undertaken in the Census of 1840 but which was in the main achieved in subsequent census enumerations. Concurrently, there came also an effort to collect statistics on agriculture through the Patent Office.[5]

While the inventory concept to set forth the resources of the country received major emphasis, along with it there was also the search for agricultural markets and for more knowledge of the competitive situation in farming as it was then developing because of the expanding production in the new colonies which brought price pressures upon the established farmers in the older areas. This was the era when the early agricultural societies flourished. In dealing with the problems of agriculture one of the objectives of these early societies became that of providing more information on production and about markets and how to reach them. Out of these efforts came also a new concept of data needs, namely, that of the changing seasonal situation during the growing months of the year and the current prospects of production throughout the country. This thinking was crystallized in the efforts of Orange Judd, the Editor of the *American Agriculturist*, when he undertook in 1862 through his paper to collect monthly data on the condition of

[1] *Principals of Statistical Inquiry as Illustrated in Proposals for Uniting an Examination into the Resources of the United States with the Census to be Taken in 1840*, published by D. Appleton and Company, New York, 1839.

[3] A message to Congress by President Martin Van Buren on December 3, 1838, in which an expansion of the census is suggested as follows: "In recommending to Congress the adoption of the necessary provisions at this session for taking the next census, or enumeration of the inhabitants of the United States, the suggestion presents itself whether the scope of the measure might not be usefully extended, by causing it to embrace authentic statistical returns of the great interests specially intrusted to, or necessarily affected by, the legislation of Congress."

[4] Archibald Russell. Page 1, "The study of statistics, whether from the light which it throws upon the social relations of society, or the information it imparts regarding its political condition, is highly valuable and instructive."

[5] It was largely through the personal interest of Henry Leavitt Ellsworth, the Commissioner of Patents, who got an appropriation for agricultural statistics from Congress in March of 1839.

crops in this country, and also to bring together what information he could on conditions in foreign countries with an eye to prospects for export markets. This project by the *American Agriculturist* was the forerunner of the government program of monthly crop reports which was one of the first things to be initiated after the establishment of the United States Department of Agriculture in 1862. The first government crop report was issued in July of 1863, in the midst of the Civil War, and since then major advances in this field frequently have been associated either with the urgent needs of war periods or with other periods of difficulty, such as the depression of the past decade.

Broadly speaking, all groups in society have had an interest in the data on agriculture. The early urging for more specific information on the farming industry came largely from agricultural groups who in studying their problems felt that they were handicapped by inadequate knowledge of the competitive situation arising out of the size and location of the various parts of their industry. They also wanted quick information on what was going on in the industry during the producing seasons so that the individual producers might make adjustments in their plans as soon as a broad knowledge regarding the current situation could be had. In addition to the older producer interest in such data there has more recently developed the consumer interest as well. This has been manifest most in periods of shortage and through trade activity which reflects consumer demand and the problems of supplying such demands. In emergency periods, such as the present war, food problems are sure to receive greatly increased emphasis, and with such periods come greatly increased demands for agricultural data of all kinds. These have a broad social motivation because in such times society as a whole is more apprehensive of scarcities of farm products. Then, too, as the Nation has become more industrialized, questions of food costs and supplies have become increasingly matters of public and political action.

III

Two main sources of data on agriculture have been developed in the United States: the enumerations by the census at fairly long intervals such as five and ten years, and the continuous activity of data collection, largely sampling, by the federal and state Departments of Agriculture. The former establishes many of the basic benchmarks by enumeration and the latter measures the continuous changes from these benchmarks and supplies such series as prices, seasonal changes, stocks, and many other items needed to round out the field. The Department

of Agriculture's work is now largely cooperative with the states which contribute in various ways.

The program of decentralization and state cooperation was made possible by the establishment of state officers about 1913. While the work of collecting agricultural data was originally a federal activity centered in Washington, some of the states had also developed agricultural enumerations usually through assessors. State agencies have definite need for agricultural data and the trend has been toward decentralization away from Washington through the building up of cooperative federal-state field units. As decentralization progresses the national work is becoming the sum of the activities at the state level to an increasing extent and the work in Washington has become a smaller part of the total. In this respect the federal agency has been fortunate in establishing cooperative relations early with most of the states, largely along the pattern first evolved in Wisconsin in 1917. The experience with such cooperation during World War I and in the period following has shown its advantages. The Nation is today much better served in this field than would be possible by a federal agency operating alone. It is fortunate, too, that this development came before the present immense expansion in federal agencies, because now such cooperative relations in the states would probably be more difficult to achieve.

In depression periods some new demands for agricultural data have taken varied forms, such as the needs for handling credit, agricultural surplus control, and other efforts to mitigate the effect of excessive supplies of farm products. Drought periods requiring relief measures have called for special types of data usually on an emergency basis. Action programs by the government in the past decade brought a number of new needs for data and they have resulted in new responsibilities. In wartime, on the other hand, there are periods of scarcity and action programs to increase production again present special problems. Programs for expanding farm output are based upon a knowledge of the existing situation. Even such projects as the establishment of war bond quotas for the rural areas are expedited when they rest upon a well-considered statistical base.

In the main, the public interest in this field has grown more slowly in peacetime and most rapidly in periods of war or other emergencies. Even so, there has been important peacetime progress and some major developments have come during such periods. The establishment of the United States Crop Reporting Board about 1906 and the initiation of the work on agricultural prices about 1908 were among the important forward steps which came in peace years.

IV

With the trend in recent years more toward a planned economy in agriculture, additional needs for detailed data have become apparent. The early developments in agricultural statistics were quite broad and general. The depression of the '30's led to various programs of agricultural production control. In the beginning these dealt mostly with the control of acreage of such crops as wheat, cotton, corn, tobacco, sugar beets, and others, and also with hogs, in the markets of which the price situation had become unsatisfactory and corrective measures were undertaken in the form of attempted production controls. Allotments were undertaken to limit acreage for various crops and also for numbers of hogs through the Agricultural Adjustment Administration. Loans on crops by the government were used in years of low price. In the carrying out of these programs, the needs for agricultural data increased more than in any previous time. Data on the commodities involved in the programs were usually wanted on a county basis and check data were desired even down to individual farms. Data available varied greatly in different parts of the country, but they were best in some of the more important agricultural states where annual enumerations by assessors were available. However, county estimates of acreage and production for some crops were undertaken in all states, as well as county estimates for certain livestock items. While data which had been collected for other purposes were often inadequate for these new needs, much was accomplished and workers in the field generally saw new horizons.

In the adjustment programs of this era there also was involved the concept of parity prices and there were programs of parity price payments to producers by the government. These were based primarily on the data on agricultural prices which had been collected by the Department of Agriculture. Annual price data on the leading agricultural items had been collected since 1866, and a program of the collection of monthly data had been initiated through the efforts of Nat C. Murray about 1908. The familiar 1910–14 base period so widely used in price indexes was also used as a basis for calculating most parity prices. This five-year period was employed because when World War I broke out there were available in the Department of Agriculture as a result of Mr. Murray's work approximately five years of fairly complete monthly price data on agricultural products. Prices paid by farmers, were also reported during the same period, but these were less complete. Even so they were the only data available and ways were found of using them. Beginning just prior to 1930 the collection of price data

which had been mostly conducted in Washington was decentralized to the state offices, which made possible some expansion of detail and larger samples.

V

More recently there has been a reversal of the government sponsored reduction programs in agriculture which characterized much of the depressed decade of the '30's. In World War II there has come an increased demand for agricultural products, and in spite of a series of remarkably good years of farm output, there are shortages. This has affected both producer and consumer psychology, and extensive programs to increase production of food for war needs have been undertaken under government leadership. In these all-out food production programs, output goals for farm products were first set up by the Department of Agriculture in 1941 for 1942. These war food production programs, like the earlier scarcity programs, rested upon a statistical base using the most recent estimates for commodities as established by the Department of Agriculture's Bureau of Agricultural Economics and its cooperating state agencies. Again there was an intense need for detailed data which would make it possible to work with the national production estimates and goals by states and counties. This work was expedited greatly by the experience of the decade of the '30's which had brought more detailed agricultural data through their use in the agricultural adjustment programs aimed at production control. While these farm programs have been initiated in Washington, they have been increasingly decentralized to the states and collection and handling of agricultural statistics is now largely being carried out in state offices. The goals of agricultural production established in Washington for 1944 because of wartime needs have been reworked by state committees which have determined finally what the proper objectives for the states should be. A further step is to break state production goals down into goals for subdivisions of states, such as counties, and to work with local agencies and farmer groups in efforts to achieve these goals.

Recent developments have brought the interests of both the producer and consumer groups close together. After all, war food production, like the war itself, is everybody's problem and food production is basic to our war effort. It is vital to the civilian population, the armed forces, and to the lend-lease arrangements with our allies. Though in the early days the collection of agricultural data was primarily motivated by the problems of producers and producer groups, it has now become vital to the thinking of all groups, producers and consumers alike. As the country has become more commercial with

fewer people on the farms and an increasing portion away from the soil, periods of crisis such as the present war make them more conscious of the food problems. Our social welfare and our morale can be affected by food supplies and food prospects, and only through some far-flung system of constantly measuring agricultural changes can the basic facts be known.

VI

Perhaps another subject in which agricultural data play a vital part should be mentioned, and that is the regulation of consumption. In a war period such as the present, shortages are inevitable and the once abundant food supply of this country has been no exception. For decades we took our food supply as a matter of course, seldom having occasion to worry about it in this country. In spite of the recent record production years, the enormously expanded requirements of World War II have outrun the supply.

In order that available supplies of scarce or badly distributed items might be equally distributed among the population, rationing programs have been necessary. Government agencies have undertaken to conserve food and to build up stock piles and reserves against future needs. More and more, a detailed knowledge of what our supplies are and what the prospective supplies are likely to be in the predictable future, is basic to our thinking. No rationing program could be intelligently undertaken without some knowledge of supplies, even as to quantity, quality, and location. The building of stock piles and the reserves assumes a knowledge of supply and prospective needs, and plans for the future must be based upon a knowledge of past production and of demands and the possibilities of meeting them. Commitments, too, will arise in the way of international collaboration on food supplies which can only be made on the basis of reasonably accurate knowledge of what we have, and what we are likely to be able to produce in the predictable future.

In the war food programs of the past two years, certain production materials have definitely been limiting factors in the farm output. Farm labor, farm machinery, feed, fertilizer, and some lesser items have been so scarce as to make their distribution a primary problem. Here again, the need for data on which distributions could be based has been urgent, and rationing programs were undertaken for farm machinery which undertook the distribution of available new equipment to the points where it would be the most productive. Critical feed supplies, lumber for farm buildings, copper wire for the wiring of electrical installations in farm buildings, and other items had to be alloted to areas

where they would accomplish most from the standpoint of the Nation's needs. Programs of supplying agricultural labor through the United States Employment Service and through the Agricultural Extension Service were based as much as possible on the data indicating the areas of greatest need. Some new material has also been assembled for this purpose in addition to the established series. In many of these new needs, agricultural statistics of a detailed nature were used as tools for doing a job in the public interest, and the last Congress strengthened the work by unifying and increasing its budget.

PROBLEMS IN ESTIMATING FOOD PRODUCTION IN WARTIME

By Joseph A. Becker
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The Department of Agriculture has been engaged in the preparation of estimates of crop and livestock production for a great many years. Impetus was given to this work by each of the major wars in which the Nation has engaged. In fact, the Department of Agriculture was founded in 1862 during the Civil War and one of its first undertakings was the compilation and publication of information upon crop prospects and production. The first appropriation for collecting agricultural statistics was made in February of 1863 and the work was continued in a modest manner through the years that followed. There was a gradual expansion in the scope of the work and a gradual improvement in estimating methods. Important advances were made in the initiation of monthly reports on prices in 1908 and the publication of quantitative forecasts of crop production in 1912.

The crop reporting work experienced a material expansion during World War I, taking on at that time the estimation of additional commodities such as fruits, vegetables, and livestock products, as well as the reporting of stocks of agricultural commodities. Important segments of work begun during the war had demonstrated their usefulness and were carried on after the war ended. The agricultural crisis of the early twenties also gave stimulus to the whole field of agricultural statistics, as administrators and researchers sought for its cause in the field of supply, demand, and price. A rapid growth took place in information relating to production, stocks, and prices. The field of reports on livestock and on livestock products was developed in this period. The depression of the thirties called for agricultural statistics in great detail, as the agricultural programs were developed on a state and county basis. In the two years of World War II that have elasped since the country became defense-conscious and then war-conscious, there has been greater public recognition of the importance of the official crop and livestock reports. Demands made for additional series and for precision in the estimates will justify their use in administrative action as well as for general information purposes.

In peacetime the public—farmer, merchant, consumer—is the most important user of crop and livestock information. Individuals bought and sold their products, raw or processed, in a relatively unrestricted market on the basis of all information available. For such use, estimates and forecasts of crop and livestock production were among those most

commonly used. Economists in the Department and in the colleges also were important clients. They used crop and livestock reports in their analyses—they advised the farmer and the public of the economic importance of the facts available to them. In recent years the economists of the action agencies of the Government have made intensive use of these data in an administrative manner in working out and adjusting their programs.

All of these clients found the information useful in relation to its precision. The public reaction to the economic appraisal of a particular situation affected the supply and demand of the commodity, or more precisely, the offerings and takings and the price. An error or lack of precision in the estimates eventually was caught up in the equilibrium that takes place in the operations of a free market.

In a wartime economy, the need for precision increases. Particularly is this true when governmental controls come into being in many phases of the Nation's economy. The public is still a client, and individuals formulate bases for action in the market as before, but their freedom of action is restricted. The economists of the Department and the colleges are still clients and their analyses and conclusions are more closely watched. The roles of the administrators of action agencies become more important and their need for precision in the estimates is enhanced. If it is the job of the administrator to allocate the supply of a commodity, he wants to be reasonably certain that his allocations will come out fairly even with the supply. If it is his job to stimulate the production of a commodity, he wants his background information to be precise.

These underlying changes are basic to the needs which develop in wartime and which have been manifested in the increased demand for estimates, the increased detail desired, and the increased scrutiny given to them.

With respect to estimating methods, the Crop Reporting Board continues to tap the same sources of information, with modifications brought about by war conditions. The greatest source of information is the farmer himself and the principal medium is the mailed inquiry. Estimates of acreage and of livestock numbers are based upon samples of the individual farms obtained in varying numbers at various times of the year. The most extensive are the Rural Carrier samples of livestock numbers obtained in June and December and of acreage harvested obtained in October. Each Rural Carrier is given 10 to 20 cards to distribute to farmers on his route. In areas where farmers are not served by Rural Carriers, the distribution is supplemented by direct mailings. The farmer is asked to fill out the card for his own farm and

return the card to his mail box. These returns have been found to be more nearly representative of all farms than any other extensive sample. They lack enough in representativeness or in randomness to make the job of estimation a continual challenge to the statisticians of the Department who utilize the returns.

The next source in size is the list of a quarter-million farmers to whom are mailed similar cards relating to their intentions-to-plant as of March 1, and relating to actual plantings as of mid-June. These inquiries are the basis of the Prospective Plantings Report and the July estimates of acreage for harvest, respectively. The Prospective Plantings Report had its inception as an outlook report for the benefit of farmers. It was designed to provide a composite picture of farmers' plans early enough in the season, so that desirable changes might be made to prevent over-production or under-production. The July acreage estimates serve as the acreage bases for the season's forecasts of crop production. More extensive in total numbers, but limited to 32 states, are the Assessors' totals of livestock assessed for taxation, and, limited to 13 states, the Assessors' enumerations of crop acreage. For certain crops, as for cotton and for corn in the "commercial" corn areas, extensive data are also available from the Agricultural Adjustment Administration records.

Important in the forecasting of crop production and in measuring milk and egg production are the 80,000 regular crop reporters who receive a general crop and livestock inquiry each month. In addition, there are dozens of lists of special reporters who furnish information on a multitude of subjects.

Personal interview by full-time employees relating to specialized crops such as vegetable crops grown in concentrated areas for shipment by truck and refrigerated cars are still relied upon, but this approach is necessarily on a restricted scale during wartime. Telephone and telegraph have to a considerable extent replaced intensive personal surveys, though occasional visitation must be continued to keep these important contacts active.

Much information is obtained from dealers and processors in farm commodities but with increasing difficulty, since these business men are short of help and are asked by other agencies of the Government to file reports and answer detailed inquiries on matters which are important to the war effort.

During recent years certain activities have been carried on which provide objective measures of crop production. Among such activities are the crop meter frontage measurements, cotton boll counts, pre-harvest wheat surveys, etc. These activities entail the extensive use of automo-

biles and have all been discontinued for the duration. Considerable experimental work with enumerative surveys has been conducted as a basis for testing the enumerative approach and the size of sample needed to obtain the specified degree of precision. An example of this was the 19-county survey in which a complete enumeration was obtained for each farm in each of 19 counties scattered throughout the North Central States. Extensive sampling tests were carried on to determine the size of sample needed to prepare reliable county estimates. Among the results of this study was the conclusion that a geographic unit of land such as the square mile section or quarter section would give the greatest precision in preparing estimates of crop acreage. This conclusion was tested out on a state-wide scale in the Indiana-Iowa Section Sample Surveys of 1940 and 1941, the results of which so far have been reported only in preliminary form. Monthly surveys of farm economic phenomena were made in Iowa in cooperation with the Agricultural College. Enumerative surveys relating to farm labor were made in the spring of 1942 in New Jersey, North Carolina, Florida, Texas, and California. Much was learned about sampling techniques in these various studies. Practically all such enumerative surveys have also been discontinued for the duration, but knowledge of sampling problems has been increased and the results have been helpful in evaluating the mailed surveys.

The mailed surveys have been continued as the principal source of information about agricultural developments. Naturally, the Board is greatly concerned about the kind of sample it provides during wartime and how the sample behaves. We have not had a great deal of experience with such samples under wartime conditions. The sampling of acreage and livestock numbers on individual farms was in its infancy in the crop and livestock estimating work at the time of World War I, as other methods were then in use. Experience to date during World War II confirms the stepping up in the spirit of cooperation among farmers, which also was characteristic of World War I. An ordinary questionnaire stated in simple form and sent at an opportune time brings a high rate of return. Undoubtedly, patriotism is a motivating force. On the other hand, a questionnaire reaching the farmer at an inopportune time when he is rushed in doing a war job of production with a war-reduced force may be neglected and the results may fall below those obtained in peacetime.

In peacetime, the returns to a mailed inquiry are self-selective—the farmers who reply have bigger and better farms, they have more livestock, they obtain higher yields of crops, and produce more livestock products than does the average farmer. Allowances are made for these

disparities in the estimating process. A favorite device is to use successive inquiries to measure change from month to month or from year to year, tying these changes back to a base figure at a date when a complete or nearly complete enumeration was made. Generally speaking, these bases are the enumerations taken by the Census at five-year intervals. In some states, there are the annual enumerations by the Assessors. For some commodities like rice and sugar beets, there are complete enumerations of receipts by processors. All such check data are historical in nature. Consequently, the results are not available until after the current reporting season is over. Where such annual enumerations of acreage or production are available, it is of course possible to calculate the regression of the universe upon the sample and utilize this regression in forecasting what the universe will show. Further illustrations of selectivity in the samples are the monthly measures of milk and egg production. Seasonality is involved and the check data are not too conclusive in appraising the degree of departures of the samples from average seasonality. In other words, it is difficult to measure how much more milk and how many more eggs are produced on the crop reporters' farms in the winter period, the season of low production. We know no more, or for that matter no less, about this selectivity in wartime than in peacetime. We find it necessary to go ahead on the basis of past experience which is largely peacetime experience. During 1943 certain check data, such as Assessors' enumerations and processing plant totals, became available for checking the production in 1942. These data gave some measure of selectivity in the samples which were collected.

In the field of forecasting and estimating crop yields, the Board did have experience during World War I. Then, as now, the crop reporters' "judgment" returns of condition and probable yield were used to prepare forecasts and estimates. A review of the information for the years 1917 and 1918 indicates some tendency toward overstatement of condition and yield. This also may have had its impetus in patriotism—in part an urge to make a good showing and in part an expression of determination to do all things necessary to accomplish a record output. Although it is not too conclusive, the evidence at least compels the Board to include the data for World War I years in the record which is used for preparing the current estimates. Just as in the field of the estimates of acreage and livestock numbers, the final check data for 1943 will give some additional information for use in 1944. Each additional year's experience should help improve the estimates in the remaining months, or years, of World War II.

A STATISTICAL ANALYSIS OF RECENT CHANGES IN COMMODITY PRICES AT WHOLESALE

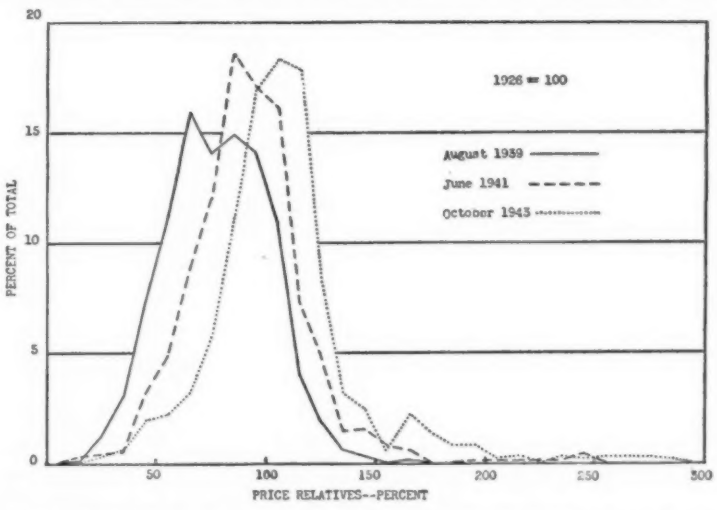
By Leonard Ascher

The rise in wholesale prices shown by the United States Bureau of Labor Statistics index of wholesale prices has been accompanied by a number of other price phenomena. This article will present some other aspects of price change that have come with the rise in that index.

As the first step in this study of prices, tabulations were made by months of the price relatives published by the United States Bureau of

CHART I

FREQUENCY DISTRIBUTIONS OF PRICE-RELATIVES OF WHOLESALE PRICES



Labor Statistics[1] covering the period of January 1937 through October 1943. Of the frequency series which were thus secured, three were selected and their frequencies expressed as a per cent of total frequency to put them on a comparable basis. Graphic presentation of these distributions is made in Chart I.

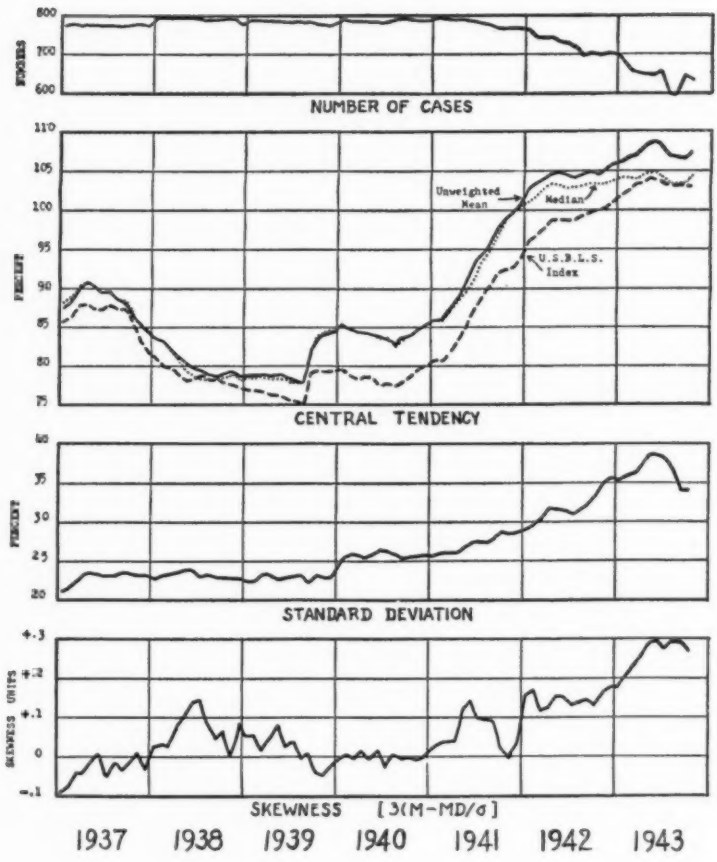
For each of the eighty-two monthly distributions of price relatives, the arithmetic mean, median, standard deviation and coefficient of skewness were computed. These measures, together with the number of

[1] United States Bureau of Labor Statistics, *Wholesale Prices*, Washington, D. C. June 1937, December 1937, June 1938, December 1938, June 1939, December 1939, June 1940, December 1940, June 1941, December 1941, June 1942. Data for the months of June 1942 to October 1943, were taken from the mimeographed releases entitled, *Average of Wholesale Prices and Index Numbers of Individual Commodities*, issued by that agency. For an analysis of price-relatives to 1937 see Leonard Ascher "Variations in Price-Relative Distributions, January 1927 to December 1936," in this Journal, Vol. 32 (June 1937), pp. 271–280. The desire to carry the analysis on from the point where the previous article left off explains the use of January 1937, as the starting point of the price-relative part of this study.

CHART II

MEASURES CALCULATED FROM PRICE-RELATIVE DISTRIBUTIONS, AND U.S.B.L.S. INDEX OF WHOLESALE PRICES. JANUARY 1937 TO OCTOBER 1943

1926 = 100



cases in each distribution, are shown in Chart II. The marked changes that have occurred, especially since the end of 1940 are clearly apparent.

Attention is particularly directed to the decline in number of price relatives reported since that time. This loss in numbers[2] has been as great as 200, and is sufficient to detract appreciably from the significance of the price relative distributions as a continuing series, a fact which should be kept in mind in interpreting results secured from them.

The disappearance of a large number of price series previously used in the index has emphasized the problem of replacing the losses with new data. This replacement is done by "splicing" new series into the index,[3] by "interpolation" and by estimation of values to replace the missing data.[4] An analysis of the information in the price bulletins reveals that there were in October 1943 quotations for 417 of the 813 series used in August 1939, indicating that at least 396 substitutions or other devices were necessary to compute the index for October. In addition, there were gaps in the new series which have been added to the list of commodities on which the index is based which raise the total above 400. In short, at least 45 per cent of the 889 price series used in the index have been war casualties.

The comparison between the index of wholesale prices and the unweighted arithmetic mean of price relatives reveals a spread of approximately five points since September 1939, and a smaller difference prior to that date. The medians of the price relative series followed the means quite closely until 1942, when they began to move to a lower level nearer to the weighted index. The unweighted means have of course been influenced by the extreme increases in prices, while the medians have been less affected, and the weighted index has evidently been least influenced of all. Caution must be used, however, in making comparisons between means, medians and index because the latter is based upon a longer list of commodity prices than the distributions of price relatives.

The rise in these measures of central tendency has been due to a general rise in prices. Of the 417 price series for which quotations were given in both August 1939 and October 1943—85 per cent showed increases, 4 per cent showed decreases and 11 per cent showed no change.[5]

[3] Price relatives are not given for all series for which there are price quotations.

[2] Cf. Jesse M. Cutts and Samuel J. Dennis, "Revised Method of Calculation of the Wholesale Price Index of the United States Bureau of Labor Statistics," in this JOURNAL, Vol. 32 (December, 1937), pp. 670–674.

[4] This information was obtained directly from the Bureau of Labor Statistics.

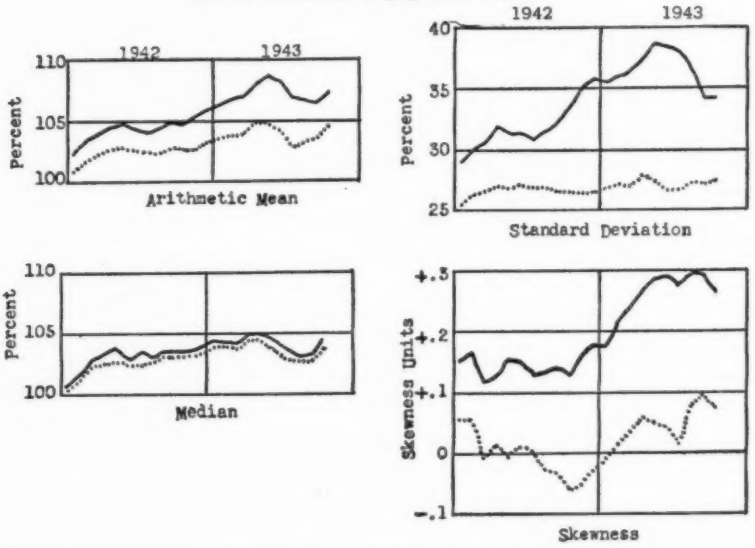
[5] Between April 1942, when the General Maximum Price Regulation went into effect, and October 1943 there were 167 price increases, of which 83 were in the Farm Products and Foods groups, 98 decreases, of which 27 were Farm Products and Foods, and 566 unchanged prices, of which 19 were Farm Products and Foods. Of the total of 831 commodities for which quotations were given in both months referred to, 20 per cent increased in price, 12 per cent decreased and 68 per cent showed no change.

A hint of which commodities were most influential in bringing this rise is found in the list of commodity groups whose prices have consistently risen higher than the index of all commodities at wholesale. These are grains, hides and skins, cattle feed, dairy products, other farm products, woolens and worsteds, other textiles, cotton goods and lumber.

CHART III

THE EFFECT OF A FEW EXCESSIVE PRICE INCREASES ON PRICE RELATIVE DISTRIBUTIONS. JANUARY 1942 TO OCTOBER 1943

Distributions with high price relatives————
Distributions without high price relatives ·····



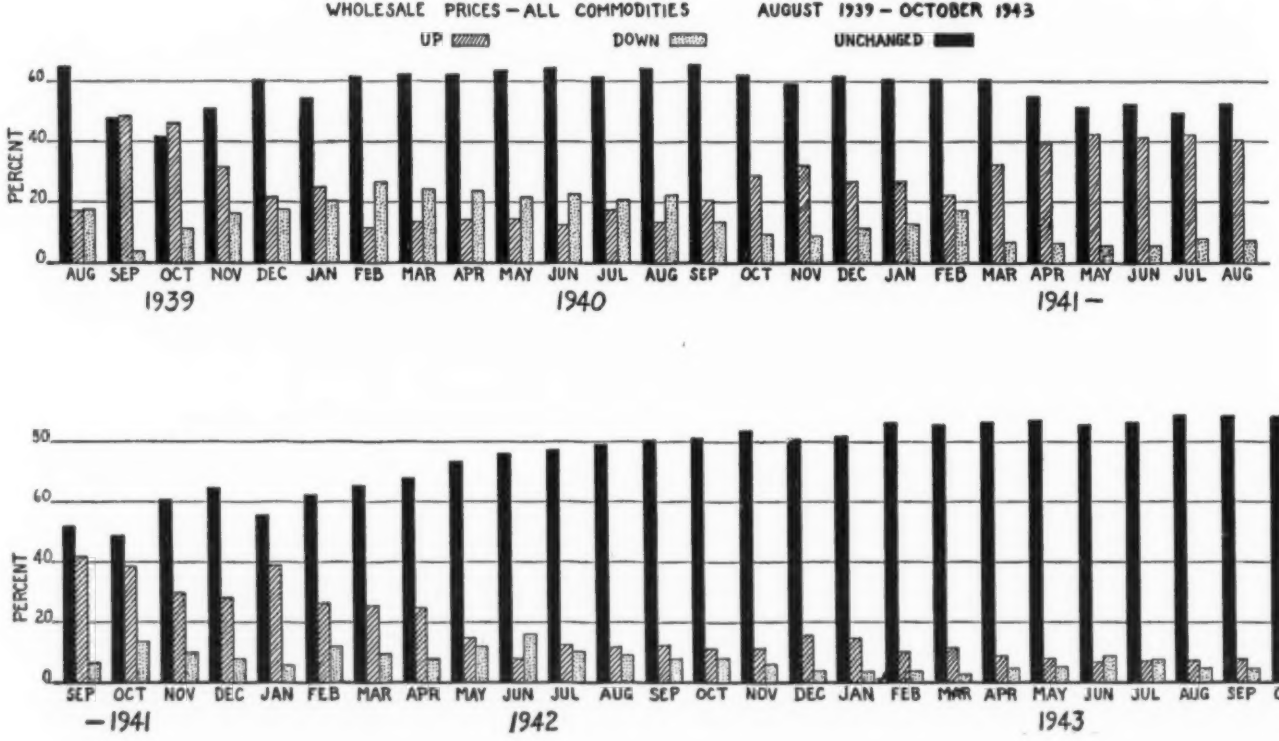
Other subgroups, such as oils and fats, have at one time or another risen higher than the index. These may be identified in the table, which arrays the Bureau of Labor Statistics sub-indexes of wholesale prices. These sub-indexes are shifted to an August 1939 base, and arrayed, with the number 1 given to the highest value in the array, and 47 to the lowest. Sub-indexes which have risen above the index of all commodities are marked by an asterisk beside their order numbers.

Since 1941, with the sharp rise in measures of central tendency, the distributions have also shown increases in dispersion and skewness. These increases have been due largely to the rise in prices of a few commodities which have imparted a "tail" to the distribution of prices, a phenomenon which appeared in 1940 and developed greatly after mid-1941. If all price relatives above 200 per cent of 1926 are excluded from the distributions for the months since December 1941, and mean, meddian, standard deviation and coefficient of skewness for each modified

CHART IV

CHANGE OVER PREVIOUS MONTH

WHOLESALE PRICES — ALL COMMODITIES AUGUST 1939 – OCTOBER 1943



ARRAY OF SUB-INDEXES OF WHOLESALE PRICES AT SELECTED DATES
(August 1939 = 100)

Sub-index	Dec. '39	June '40	Dec. '40	June '41	Dec. '41	June '42	Dec. '42	June '43	Oct. '43
Grains	1*	3*	3*	3*	3*	5*	4*	3*	2*
Hides and skins	2*	17*	4*	4*	8*	11*	13*	14*	13*
Cattle feed	3*	4*	2*	10*	2*	2*	3*	4*	3*
Other textiles	4*	5*	9*	2*	7*	10*	12*	11*	12*
Oils and fats	5*	8*	27	1*	1*	1*	1*	1*	1*
Rubber	6*	1*	7*	8*	14*	17*	16	16	16
Dairy products	7*	16*	6*	15*	12*	15*	9*	9*	10*
Woolens and worsteds	8*	9*	8*	13*	13*	13*	14*	15*	14*
Cotton goods	9*	22*	11*	5*	4*	6*	8*	8*	8*
Other farm products	10*	7*	12*	12*	6*	8*	6*	6*	5*
Non-ferrous metals	11*	11*	15*	21	32	35	34	35	36
Cereal products	12*	12*	31	24	18	23	19	19	18
Paper and pulp	13*	6*	10*	17*	16*	18	20	18	17
Lumber	14*	20*	1*	9*	11*	14*	15*	13*	11*
Other foods	15*	30	16*	7*	9*	12*	10*	10*	9*
Fertilizer materials	16*	26	20*	33	24	28	25	29	23
Fruits and vegetables	17*	2*	26	14*	17*	3*	7*	2*	6*
Hosiery and underwear	18*	35	43	42	38	38	37	37	35
Shoes	19*	13*	21	25	22	19	18	20	21
Other miscellaneous	20*	27	33	31	33	36	33	34	31
Coke	21	19*	18*	18*	27	31	31	32	33
Anthracite	22	14*	13*	23	25	29	27	22	22
Furnishings	23	18*	23	26	28	27	28	30	30
Paint, paint materials	24	24*	29	27	26	21	21	21	20
Drugs	25	15*	5*	11*	5*	7*	2*	5*	4*
Other bldg. materials	26	23*	22	29	31	32	35	39	38
Rayon	27	25*	30	37	40	41	41	41	41
Clothing	28	21*	24	22	20	16*	17	17	19
Other leather products	29	28	32	34	29	30	29	31	32
Electricity	30	44	44	47	47	47	47	47	47
Motor vehicles	31	29	19*	28	19	22	22	23	25
Bituminous coal	32	37	25	30	34	37	32	24	26
Chemicals	33	31	34	36	41	34	36	36	37
Furniture	34	34	37	32	23	26	26	26	27
Petroleum products	35	45	46	20	30	33	30	25	24
Brick and tile	36	38	38	38	39	40	40	40	40
Mixed fertilizers	37	39	35	39	37	39	39	33	34
Iron and steel	38	41	39	40	44	44	44	44	44
Structural steel	39	36	40	43	45	45	45	45	45
Plumbing and heating	40	32	36	35	35	20	38	38	39
Cement	41	40	41	41	43	43	43	43	43
Agricultural implements	42	42	42	44	42	42	42	42	42
Livestock	43	43	17*	6*	10*	4*	5*	7*	7*
Leather	44	10*	14*	19*	21	24	23	28	29
Meats	45	47	28	16*	15*	9*	11*	12*	15*
Gas	46	33	47	46	46	46	46	46	46
Automobile tires	47	46	45	45	36	25	24	27	28

* Sub-indexes so designated rose higher than the all commodities index.

distribution is computed, a different picture is obtained. As Chart III shows, the means so secured are considerably below those computed from the full distributions, the medians are only slightly below, but dispersion and skewness are reduced drastically, indicating that the rises in dispersion and skewness observed in the full distributions were due to the few extraordinary increases. The lowest number of cases dropped was seven, and the highest was sixteen. Six price series were above 200 throughout 1942 and 1943; olive oil, quicksilver, boards and shiplap, China wood oil, cream of tartar and tartaric acid; while apples, cows, hops, alfalfa seed, sweet potatoes, bananas, ethyl alcohol, menthol, sulfur olive oil, and barrels were above the 200 mark for several of the months covered. The diversity of this list demonstrates that the increase in skewness and dispersion in 1942 and 1943 cannot be attributed to any one group of prices, such as farm prices.

A characteristic of the wholesale price list is its relative sluggishness. This is brought out in Chart IV, which shows the proportion of prices which increased over the previous month, the proportion which decreased, and the proportion which remained unchanged. In only five months of the fifty-one months covered in the chart, did more than half of the eight-hundred-odd[6] prices change. In contrast, the proportion of prices which show no change from one month to the next has been consistently high.

Another aspect of the price changes is the interchange in price relationships which has occurred. It is not possible to show this for all the individual commodities, but an indication of what has happened can be obtained by referring to the movement of the prices of commodity groups. Some of these commodity groups have risen in price, others have fallen, and many have not changed; furthermore, the rates of change have varied from group to group. The end result is that commodities have shifted about in the price structure producing a new pattern of price relationships. This is demonstrated in the table, which shows the relative position of the Bureau of Labor Statistics indexes of prices of sub-groups of commodities at specified dates. The lack of consistency in maintaining relative position is apparent in the case of many commodity groups, and in some the changes have been quite marked. In a profit and loss economy in which so much depends on price relationships, these shifts in the price structure are of utmost importance. They are, in fact, probably of greater significance than any other change in price phenomena.

[6] These tabulations of increases, decreases, and no change, were made by the Bureau from the price series actually used in the index of wholesale prices, and included 813 cases in August 1939, but changed to 889 when the basis of the index was changed. These tabulations have appeared irregularly in the wholesale price bulletins, and some of the missing data had to be secured direct from the Bureau of Labor Statistics.

STANDARD COMMODITY CLASSIFICATION

By Vladimir S. Kolesnikoff
United States Bureau of the Budget

The United States project on standard commodity classification is sponsored by the Bureau of the Budget, the War Production Board, and the Procurement Division of the Treasury Department, and is carried on, under the general supervision of the Interagency Committee on Standard Commodity Classification, by a Technical Committee assisted by forty committees of experts.[1]

In the preface to the volume recently published,[2] the purpose of the Standard Commodity Classification is stated as follows:

> Standardization in classification and in presentation of statistical data concerning commodities is urgently needed. At present there are many different classification systems in use by Federal agencies and in some instances different commodity classifications, often noncomparable at many points, are being used within the same agency. The comparability of commodity data and hence their value will be tremendously increased by the use of a standard system of classification and presentation.
>
> The purpose of the Standard Classified List of Commodities is to meet the need for such a system. To the extent that it is uniformly used, it will insure reasonable comparability between the commodity data of separate Federal agencies. Some users may wish to employ both the numbering system and the classification structure of the Standard List. Others will prefer to set up their own codes on bases convertible to the Standard List. But so far as practicable in all cases agencies should present their commodity data according to the arrangement in the Standard Classified List of Commodities.

A discussion of the background, history, and description of the Standard Commodity Classification should help to explain the essential fea-

[1] **The Interagency Committee:** *Stuart A. Rice*, Bureau of the Budget, Chairman; *Major Robert Bruce*, War Dept.; *E. Dana Durand*, U. S. Tariff Commission (*Louis S. Ballif*, alternate); *Howard C. Grieves*, WPB; *V. S. Kolesnikoff*, Bureau of the Budget; *Robert LeFevre*, Procurement Division, Dept. of the Treasury; *Commander Ogden Ludlow*, Navy Dept.; *Howard H. McClure*, Dept. of Commerce (*Maxwell R. Conklin*, alternate); *Blackwell Smith*, WPB; *George A. Viehman*, U. S. Maritime Commission; *Albert Waterston*, Foreign Economic Administration.

The Technical Committee: *V. S. Kolesnikoff*, Bureau of the Budget, Chairman; *Tillman M. Sogge*, Dept. of Commerce, Vice-Chairman; *Louis S. Ballif*, U. S. Tariff Commission; *Captain Arthur J. Beck*, War Dept.; *Maurice H. Bletz*, U. S. Tariff Commission; *George G. Brown*, WPB (assigned to the Procurement Division, Dept. of the Treasury); *C. C. Concannon* and *Thomas W. Delahanty*, Dept. of Commerce; *Bruno Fels*, Bureau of the Budget; *Frank Gonet*, U. S. Tariff Commission; *Howard C. Grieves*, WPB; *Esther Pearce*, Bureau of the Budget; *George M. Pollard*, WPB; *Ralph W. Smith*, National Bureau of Standards; *Thomas H. Southard*, WPB.

Special contributions to this project were made by Mr. Louis S. Ballif, U. S. Tariff Commission, Mr. Maxwell R. Conklin, Bureau of the Census; Mr. Howard C. Grieves, WPB; Mr. William R. Leonard, Bureau of the Budget; Mr. Horace B. McCoy, Bureau of Foreign and Domestic Commerce; Mr. James Knox, WPB (assigned to the Procurement Division, Dept. of the Treasury); and Mr. F. A. Mapes, Procurement Division, Dept. of the Treasury, who gave valuable advice and made the necessary administrative arrangements to permit the Technical Committee to function effectively.

[2] *Standard Commodity Classification*, Volume I, "Classified List of Commodities," Technical Paper No. 26, May 1943; Volume II, "Alphabetic Index," Technical Paper No. 27, February 1944, Superintendent of Documents, Washington, D. C.

tures of the United States Commodity Classification System. The absence of satisfactory uniform classification of commodities has always been a matter of deep concern to members of executive and research staffs.

As long as twenty-five years ago, in 1919, a special interagency committee struggled with the glaring inconsistencies and differences in classifications of commodities which prevented getting an account of manufacturing production which could be compared with the accounts of export and import. At that time and later, the Brussels Convention of 1913 on International Commodity Classification, designed primarily to bring some semblance of order in the reports on international trade, could not satisfy immediate needs of the United States because the classification was drafted as a special minimum list of 186 selected items without a definite indication of what these 186 groups should include.

The classification of commodities developed by the Committee of Statistical Experts and accepted by the Council of the League of Nations, September 17, 1935, was also developed as a minimum list for the same purposes as the Brussels classification of 1913. The Committee, in its report, emphasized that the League of Nations minimum list of commodities for international trade should not be considered as a classification system designed to replace any national classification and should serve only as an instrument for comparison of the national export-import reports. Presenting a special listing of 456 selected commodity items and commodity groups, it has never been suggested as a base for development of detailed commodity classification to be used by all branches of business and Government. Finally, in 1939, the United States Central Statistical Board, in its formal report to the Director of the Bureau of the Budget, recommended the development of a standard scheme of commodity classification to supplement the standard industrial code and to put export-import statistics on a comparable basis with production statistics.

So far as the field of commodity statistics is concerned, the great mobilization of the United States production facilities for effective execution of the war program was responsible for the appearance of a substantial number of very important problems. Among these are the need for data on critical and essential materials; development and use of substitutes and entirely new materials; creation and production of new commodities; development of priority and allocation plans; the magnitude of commodity items handled by manufacturers, procurement, and operating war agencies; and the problem of preparing requirements programs, national and international. Attention was called forcefully to the fact that in the midst of war there was no uniform

classification of materials and products. The new problems of reconversion and termination of contracts will bring and are already bringing problems of describing and handling surpluses of raw materials, goods in process, machine tools and equipment.

A United States Senate resolution relating to the problem of postwar surpluses refers to the "types of commodities." Types of commodities will have no single definite meaning if they are not established uniformly throughout the whole Federal Government. In turn, types of commodities could not be established without classification and, what is most important, without uniform classification. Uniformity of concept of commodity groups becomes indispensable when condensed reports by groups without any listing of individual items are required. Under these circumstances, we have a very limited choice: it is either uniform classification or chaos. To illustrate the importance and significance of uniform grouping of commodities, in one article published in *Estadística*, the Journal of the Inter American Statistical Institute,[3] it was said:

> The term "aircraft" has sometimes referred to an aggregate of airplanes, helicopters, gliders, airships, and similar vehicles, without equipment; sometimes it has meant an aggregate of such units together with their components such as aircraft engines and propellers; sometimes it has referred to complete units including components, parts of components, and armament equipment; while sometimes it has included such additional items as flight equipment for personnel, aircraft ground equipment, airplane catapults, link trainers, and airplane landing mats. We can see that if no uniformity in the grouping of commodities is established, names of groups do not mean much. The case of "aircraft" is not an exceptional one. In almost every type of commodity we find similar situations in which the precise content of terms used in classification is based either on tradition or on arbitrary decisions. Sometimes differences in definitions are responsible for differences in classification. For example, acceptable practice defines "machine tools" as non-portable, power driven machines that shape metal by progressively removing stock in the form of chips or shavings. But a number of agencies do not know or disregard this definition and include in statistics of machine tools all metal forming machines such as bending, pressing, shearing, punching, and forming machines; other agencies go even further and list as machine tools all machinery generally expected to be found in machine shops such as testing and measuring machines, balancing machines, hoists, and cranes. Uniformity of definition is thus a principal objective of a standard commodity classification.

In June 1941, after appraisal of the existing situation and anticipating war and postwar problems in the handling of surplus property similar to those which developed following World War I, the Assistant Director of the Bureau of the Budget in Charge of Statistical Stand-

[3] *Estadística*, No. 3, V. S. Kolesnikoff, "The United States Project on Standard Commodity Classification."

ards, Dr. Stuart A. Rice, assigned some members of his staff to work on commodity classification. The work resulted in preparing a number of tentative schemes of commodity classification systems, which were submitted to a special interdepartmental conference in December 1941; in drafting a three-digit and then a four-digit commodity code for technical comments of commodity specialists, economists and statisticians; in organizing a special interdepartmental committee, under the Chairmanship of Dr. Rice; and in appointing the Technical Committee, assisted by 40 special committees of experts[4] and charged with the task of developing the United States Standard Commodity Classification.

In the course of preliminary preparations for the interdepartmental conference of 1941, which was called to select a classification system, a suggestion was made that in a standard classified list of commodities a so-called "omnibus code" be used, incorporating several different bases of classification such as (1) use, (2) material, (3) degree of manufacture, (4) origin, (5) producers and consumers, (6) durability, and (7) industry responsible for appearance of the commodity listed, which should occupy fixed positions. It was obvious that incorporation of seven classification codes into one would require even for very broad classification at least fifteen and very likely more digits. This would force prospective users to operate in terms of the omnibus code whether or not its component parts were wanted; in every case of a need for the more detailed classification, the omnibus code would have to be

[4] Complete membership of all committees is given in a published volume of the Standard Commodity Classification. Here it is possible to report only the names of Chairmen of the Special Committees: *J. Mark Albertson*, U. S. Tariff Commission—Nonmetallic Minerals and Ceramic Products; *Serge N. Benson*, U. S. Tariff Commission—Rubber; *Maurice H. Bletz*, U. S. Tariff Commission—Lighting Equipment and Fixtures; *Paul F. Burnham*, U. S. Tariff Commission—Plastic Products; *L. V. Burrows*, WPB—Photographic Goods; *Marshall R. Colberg*, WPB—Aircraft; *Edward J. Detgen*, Bureau of Foreign and Domestic Commerce—Cork; *Joseph M. P. Donohoe*, U. S. Tariff Commission—Lumber; *Meiric K. Dutton*, WPB—Products of Printing and Publishing Industries; *C. J. Enright*, WPB—Ships; *Bruno Fels*, Bureau of the Budget—Nonferrous Metals, Industrial Furnaces; *Walter J. Goehring*, OPA—Valves and Steam Specialties; *Charles Haas*, WPB—Ordnance; *Frederick Harrison*, Bureau of the Census—Railroad Transportation Equipment; *James H. Hibben*, U. S. Tariff Commission—Chemicals, Drugs, Soap and Cosmetics; *Ralph C. Janoschka*, WPB—Paper; *Walter A. Janssen*, Bureau of Foreign and Domestic Commerce—Metallic Ores and Concentrates, Ferro-Alloys; *O. A. Juve*, U. S. Tariff Commission—Agricultural Products, Food, Beverages; *V. S. Kolesnikoff*, Bureau of the Budget—Metalworking Machinery; *Fred B. Lautzenhiser*, WPB—Motor Vehicles; *F. Morton Leonard*, U. S. Tariff Commission—Fabricated Metal Basic Materials; *Charles E. Lund*, Bureau of Foreign and Domestic Commerce—Oils and Fats; *Vincent T. Manas*, Federal Public Housing Authority—Plumbing and Heating Equipment; *William H. Myer*, Bureau of Foreign and Domestic Commerce—General Industrial Machinery and Equipment, Special Industry Machinery; *J. Jos. W. Palmer*, Bureau of Foreign and Domestic Commerce—Products of the Metal Industries; *Donald S. Parris*, Bureau of Foreign and Domestic Commerce—Furniture; *George M. Pollard*, WPB—Iron and Steel; *Charles L. Saunders*, WPB—Instruments; *J. G. Schnitzer*, Bureau of Foreign and Domestic Commerce—Leather and Leather Products; *Sterling F. Smith*, WPB—Air-Conditioning and Refrigerating Equipment; *Tillman M. Sogge*, Bureau of the Census—Miscellaneous Products; *Robert P. Sweeny*, Bureau of Foreign and Domestic Commerce—Textiles; *W. R. Turner*, WPB—Optical Instruments; *Howard E. Way*, Bureau of Foreign and Domestic Commerce—Communication Equipment; *Nicholas Yaworski*, Bureau of the Census—Coal and Coal Products.

reconstructed all over again. Thus, the suggestion was not developed into a definite recommendation.

A second suggestion that died on its way to the interdepartmental conference provided for developing seven or more separate single-principle codes to be used independently when necessary. Co-existence of seven independent codes would be extremely confusing, introducing a possibility that a number of different classifications could be used by various agencies and in consequence defeating the fundamental ideal of uniformity.

Of the commodity classification systems submitted to the interdepartmental conference for a selection, three were considered:

(1) "Vertical" classification according to materials,
(2) "Industrial" classification according to classification of industries responsible for the appearance of commodities listed, and
(3) "Horizontal" classification by stage of production.

A great deal has been, could be, and it is believed will be said for and against each one of these single-principle classification systems.

In favor of the "Vertical" classification, are the facts that the United States Department of Commerce uses a similar system for classification of commodities exported from and imported into the United States, and that the Committee of Statistical Experts of the League of Nations, after prolonged discussions, finally decided to compile its minimum list for international trade on this principle. However, the League of Nations Committee, recognizing that there is no difficulty in classifying crude materials and semi-manufactured on the basis of materials, admitted that the classification falls down when this principle is used in an attempt to classify finished products of manufacturing. Each of such groups of articles as furniture, apparel, musical instruments, communication equipment, would go into different places in the classification system or, after unsuccessful journey all around the list, would finally land in a huge section known as "miscellaneous," or be organized into a special class in violation of the single-principle of the classification. In addition, the vertical system of grouping crude materials and their manufactures, admittedly very convenient for some analytical purposes, would create extreme difficulties for agencies, business organizations and entities specializing in crude materials only or in manufactured products only. Finally, such commodity groups as "manufactures of tin" would not be representative and would therefore remain misleading and meaningless.

The second type, "Industrial" classification, would list all commodities according to the same system as industries responsible for the appearance of such commodities are classified. The difficulty with this

type of classification is that quite frequently the same commodity is a product of two or more industries. The apparent simplicity of this classification is also outweighed by the fact that the industrial structure and therefore the industrial classification might differ from country to country and, as a direct result, classification of industries would never constitute a good base for classification of commodities, and especially for compiling international lists.

The third "Horizontal," single-principle classification, according to the stage of production, keeps crude materials separate from semi-manufactured and manufactured products, and in this respect is very practical and convenient. Nonetheless, this classification would, quite unnecessarily, introduce an extremely difficult technical task of defining the concept of semi-manufactured goods. At the same time it appears that in a very long list of goods, semi-manufactured or manufactured, some additional and entirely different principle would be required for subdivisions.

The conference expressed the opinion that in a classification system it would be advisable to keep crude materials, industrial goods, and finished manufactures in separate sections.

Members of the research staff assigned to the task have been of the opinion that a classified list of commodities should follow the system of their handling by the trade and by operating agencies of the government. One essential fact was recognized, namely, that *the principles of natural classification of materials differ from the principles of classification of products.* When we classify materials (crude, semi-manufactured, or manufactured) used in the process of further manufacturing or in construction, we speak in such terms as hides, fibers, iron, steel, stone, brick, glass, coal, and lumber. When we refer to the end products, i.e., to the articles with process of manufacturing already completed, where there is no room for further manufacturing except assembling operations, the material quite frequently loses its significance or even cannot be traced. It is the article itself we are looking for, associating the idea of the article with the broad idea of use. For us, a chair is not a product of wood, metal, or plastics, but a piece of furniture; the telephone receiving apparatus on our desks always will be associated with the idea of transmittal of conversation or with the broader idea of communication and it would be futile to try to find out what chief material was used in manufacturing this piece of communication equipment; a bathing suit that might be made of cotton, wool, rayon, nylon, glass, or bronze, would never be referred to as a vegetable, animal, metal, or glass product, but always would be identified as a bathing suit, sometimes without any reference to material.

For the construction of a standard list that would provide for the needs of reports on production, on exports, imports, and also the needs of agencies engaged in planning and analysis, and at the same time satisfy the needs of agencies responsible for handling inventories, a single-principle classification would not be as useful as a dual-principle system based on the crude materials, basic materials, and end products concept. In a standard classified list constructed according to a dual-principle system, commodities handled by the Census of Agriculture would be listed separately from commodities covered by the Census of Manufactures or by the Census of Mines; commodities handled by agencies primarily interested in end products would not be mixed with crude materials.

Finally, a new system of classification was submitted to and accepted by the Interagency Committee. This system provided that the Standard Classified List of Commodities, when finally developed and completed, would have the following columns:

Column 1. Numerical code for each commodity item listed;
Column 2. Standard Classified List of Commodities to serve as a master or base list;
Column 3. Standard unit of measure for each commodity item listed;
Column 4. Supplementary single-principle code for classification of commodities according to industries responsible for their appearance;
Column 5. Supplementary code to indicate the economic class of commodities.

It is well to remember that the convenient structure of the Standard Classified List (Column 2) is recognized as a most important feature of the classification system, receiving priority over supplementary single-principle codes to be developed for analytical purposes.

In order to avoid any possible misunderstanding, it is necessary to state that the Interagency Committee on Standard Commodity Classification decided that Columns 1 and 2 should be published immediately; Column 3, either in connection with expanded and revised lists, or in connection with Volume III of *Standard Commodity Classification* which will contain definitions and descriptions; Column 4 and Column 5 to be developed after the war.

Classified list (Column 2) and numerical code (Column 1) require more detailed explanation.

The Standard Classified List of Commodities has three parts.

Part one includes crude materials, namely non-manufactured prod-

ucts of agriculture and mining industries, and other crudes, such as products of hunting, forestry, and fishing. This part embraces major groups beginning with "0" and identified as follows:

01 Live Animals
02 Crude Animal Products, Edible
03 Crude Animal Products, Inedible, Except Fibers
04 Crude Vegetable Products, Edible
05 Crude Vegetable Products, Inedible, Except Fibers
06 Fibers, Vegetable and Animal, Unmanufactured
07 Coal, Crude Petroleum, and Related Crude Hydrocarbons
08 Metallic Ores, Concentrates and Their Unrefined Metallic Products
09 Crude Nonmetallic Minerals, Except Coal and Petroleum

Unfortunately, a detailed description of further subdivisions of major groups in this part as well as in parts 2 and 3 with a total number of classified items more than 35,000, would be too long for inclusion here. The reader is referred to Volume I of *Standard Commodity Classification* described in footnote 2.

Part two includes basic materials or basic industrial goods either semi-manufactured or manufactured, used for further manufacturing, or in process of construction. Predominantly they are not ready for use as such except a few isolated items such as yarns for crochet or wrapping paper. This part includes major groups beginning with "1" and "2" listed in the following order:

11 Leather
12 Boot and Shoe Cut Stock and Shoe Findings
13 Wood Basic Materials, Except Pulpwood
14 Pulp, Paper, and Paperboard
15 Textile Basic Manufactures
16 Food and Beverage Basic Materials
17 Oils, Fats, Waxes, and Derivatives, Animal and Vegetable
18 Petroleum and Coal Products, Except Raw Materials for Chemical Industries
19 Chemicals
21 Iron, and Iron and Steel Scrap
22 Steel
23 Ferro and Nonferrous Additive Alloys
24 Nonferrous Metals
25 Fabricated Metal Basic Products
26 Nonmetallic Mineral Basic Products—Chiefly Structural
27 Nonmetallic Mineral Basic Products—Chiefly Nonstructural
29 Miscellaneous Basic Materials

Part three includes end products of manufacturing industries, previ-

ously explained. They consist of complete articles and also component parts. The following two-digit major groups are included in this part:

31 General Purpose Industrial Machinery and Equipment
32 Electrical Machinery and Apparatus
33 Special Industry Machinery (Machinery for Selected Industries Requiring Specialized Machines)
34 Metalworking Machinery
35 Agricultural Machinery and Implements, Except Tractors
36 Construction, Mining, Excavating and Related Machinery
37 Tractors
38 Office Machines
39 Miscellaneous Machinery
41 Communication Equipment and Electronic Devices
42 Aircraft
43 Ships, Small Watercraft, and Marine Propulsion Machinery
44 Railroad Transportation Equipment
45 Motor Vehicles
49 Miscellaneous Transportation Equipment
51 Plumbing and Heating Equipment
52 Air-Conditioning and Refrigeration Equipment
53 Lighting Fixtures
54 Furniture and Fixtures
55 Photographic Goods and Processed Motion Pictures
56 Optical Instruments and Apparatus
57 Indicating, Recording, and Controlling Instruments and Accessories, Except Watches and Clocks
58 Professional and Scientific Instruments and Apparatus, Except Indicating, Recording, and Controlling
59 Miscellaneous Equipment
61 Food, Manufactured
62 Feed, Manufactured
63 Beverages and Ice
64 Tobacco Manufactures
65 Drugs and Medicines
66 Toiletries, Cosmetics, Soap, and Household Chemical Preparations
67 Apparel, Except Footwear
68 Footwear
69 Fabricated Textile Products, Except Apparel
71 End Products of Leather, Except Apparel, Footwear and Luggage
72 Converted Paper Products and Pulp Goods
73 Products of Printing and Publishing Industries
74 Rubber End Products, Natural and Synthetic, Except Footwear and Clothing
75 End Products of Metal Industries, Except Machinery and Equipment
76 Finished Wood Products, Except Furniture and Millwork

77 End Products of Glass, Clay, and Stone
79 Miscellaneous End Products of Manufacturing Industries
81 Small Arms and Components
82 Artillery, Naval Guns, Mortars, and Components
83 Small Arms, Ammunition and Specifically Adapted Components
84 Artillery, Naval, and Mortar Ammunition and Specifically Adapted Components
85 Aerial Bombs and Specifically Adapted Components
86 Miscellaneous Ammunition and Related Products
87 Common Components of Ammunition
88 Fire Control Equipment
89 Miscellaneous Ordnance and Ordnance Material

One can readily memorize the whole structure by observing that major groups beginning with the integer "3" cover machinery; beginning with "4" cover communication and transportation equipment; "5" cover equipment except machinery and transportation equipment; major groups beginning with "6" cover non-durable consumers goods; beginning with "7" miscellaneous manufacturing; and major groups beginning with "8" cover specialized items of ordnance.

No attempt was made to make each major group strictly homogeneous, for the very simple reason of the limitations of the decimal system. However, the principle of homogeneous grouping was observed in further sub-divisions of major groups into three-digit groups, four-digit groups and all other detailed sub-divisions.

There are a few instances where the content of the major groups could be criticized as inconsistent and therefore violating principles established for the system. For example, in group 638, natural ice is listed as sub-group 6382 next to sub-group 6381, manufactured ice. Purists would rather see natural ice placed with crude materials; however, it was recognized that since there is no difference between the two commodities it would be more desirable to keep all ice in one place.

To meet the needs of agencies which handle not only commodity data but also associated items such as rentals, repair and maintenance, and personal services, it was decided to keep the remaining part of the numerical code beginning with "9" vacant, reserved as part four of the code for supplementary non-commodity items.

A description of the Standard Code would not be complete without reference to the numerical structure of the code selected for the Standard Commodity Classification System. From the very beginning, it was established as a fundamental requirement that the numerical code should be constructed on the decimal system and as such be adaptable for handling records by means of tabulating machines. The numerical

code shown in column I of the Classified List is developed in such a manner that a great number of individual items could be accumulated in a minimum time and with all totals and subtotals readily available. Technical Paper No. 26 describes the decimal system as follows:

> Throughout the classification structure the 0 integer has been reserved for commodity-group titles within which the integers 1 through 9 will identify specific subtitles. The integer 9 identifies residue groups, and commodities whose codes end in this number usually bear the prefix miscellaneous or the suffix not elsewhere classified. In instances where one digit did not provide a sufficient number of integers for identifying the sub-divisions needed within a given category it has been necessary to use two digits, and occasionally three digits. If two digits are used, the code for the group heading ends with 00; the numbers 01–08, 11–18, 21–28, etc., are used and 99 is used for not elsewhere classified. (Note that numbers between 00 and 99 which end with 0 and 9 are not used.) If three digits are used, the code for the group heading ends with 000, and 999 is used for not elsewhere classified.

The Standard Commodity Classification, as it now stands, is designed primarily for general statistical purposes including preparation of program requirements, production reports and reports on international trade. In order to make it available and applicable for inventory control purposes, this classification system should be greatly expanded so as to present not only the classification structure but also to provide for detailed listings of individual items to be identified for inventory purposes.

The Procurement Division of the Treasury Department has already decided to use the Standard Commodity Classification and has begun, in collaboration with the Bureau of the Budget and the committee structure of the Standard Commodity Classification system, to work on extensive expansions of this classification in order to adapt it to the needs of the Procurement Division's surplus property responsibilities.

Since problems faced by the Procurement Division are similar to the problems of other agencies responsible for reports on inventories, it appears very desirable to do the complete job of expansion of the commodity classification for inventory purposes on an interagency basis, pulling together all available resources. Such combination of efforts is indispensable because it is a big job far beyond the facilities of one department.

PHYSICAL MEASUREMENTS OF MOUNT HOLYOKE COLLEGE FRESHMEN IN 1918 AND 1943

By Marion Gillim*
Mount Holyoke College

It is widely believed that the American soldier of World War II is taller, heavier and stronger than his counterpart of World War I. Morris Fishbein wrote in December 1941:

> Available figures indicate that physical examinations made of selectees of the National Guard, the "volunteers," the regular army and even the young men examined for the CCC and NYA show an increase in height and weight over young men of the same ages examined in 1917.[1]

Interest in the question whether the young women of today are also stronger and larger than those of twenty-five years ago led the class in elementary statistics of the Department of Economics and Sociology at Mount Holyoke College to make a comparative study of physical measurements of freshmen entering the college in 1918 and 1943.

The study employs the physical records of 250 freshmen of 1918 and 308 freshmen of 1943. The measurements used are those of height, weight, lung capacity and the grip of the right and left hands. Height was measured to the nearest tenth of a centimeter. The use in 1943 of a wall stadiometer instead of the free-standing wooden stadiometer of 1918 probably does not injure the comparability of the measurements of height made in the two years. Although in 1918 lung capacity was measured to the nearest cubic inch by an older model double pulley spirometer and in 1943 to the nearest tenth of a liter by a new and more accurate single pulley spirometer, the data are considered comparable.[2] Weight was recorded to the nearest quarter of a pound. A regulation garment, weighing approximately one-half pound, was worn in both years. The weight of the robe was deducted from the recorded weight in 1918 but not in 1943. The arithmetic mean of the weights in 1943 has been corrected for this difference in the method of recording. The same type of device was employed in both years to measure grip to the nearest kilogram.

The examinations for both classes were in September of the year of entrance, and were scheduled throughout the mornings and afternoons. The measurements were made by the members of the Department of

* The author acknowledges the assistance of Miss Shirley Garfield and Miss Margaret Welch.

[1] Morris Fishbein, "American and German Standards of Physical Fitness," *Hygeia*, December 1941, p. 953.

[2] The present spirometer is blown easily, and therefore is less likely to underestimate lung capacity than some other spirometers. (Abby H. Turner, "Vital Capacity in College Women: I," p. 3, Reprinted from the *Archives of Internal Medicine*, Vol. 46, 1930, pp. 930–937.)

Physical Education which has maintained sufficient continuity of personnel to assure uniformity in technique. To facilitate computations, the data were transcribed to cards by the members of the class in statistics. The arithmetic means and standard deviations, as calculated from a frequency distribution of each measurement, are shown in Table I for both 1918 and 1943.

TABLE I

ARITHMETIC MEANS AND STANDARD DEVIATIONS OF PHYSICAL MEASUREMENTS OF 250 FRESHMEN IN 1918 AND 308 FRESHMEN IN 1943 AT MOUNT HOLYOKE COLLEGE

Measurement	Arithmetic mean		Standard deviation	
	1918	1943	1918	1943
Height (centimeters)	161.7	164.8	6.3	5.9
Weight (pounds)	118.4*	128.0*	16.6	17.2
Lung capacity (liters)	2.6	3.2	.41	.47
Right grip (kilograms)	30.2	31.7	5.0	5.7
Left grip (kilograms)	28.7	29.5	4.4	5.4
Stronger grip (kilograms)	30.9	32.3	4.6	5.4

* Exclusive of garment weighing one-half pound.

For each measurement the arithmetic mean of 1943 exceeds that of 1918. There is clear indication of the greater size and strength of the later group.[3] Except for left grip, the differences between the two years are too great to be attributed to chance.[4] The failure of left grip to increase as significantly as right grip suggests that exercise may have

[3] Similar findings have been reported in other studies of college students in earlier periods. One was made by Mabel Newcomer in 1921 of the changes in physical measurements—including height, weight and lung capacity—of Vassar College freshmen from 1884 to 1920 inclusive. Within that period the average of all these measures increased. Between 1890 and 1920 height, as described by the arithmetic mean, increased by 3.3 centimeters or 1.3 inches, from 160.4 centimeters to 163.7 centimeters. The mean weight increased six and one half pounds from 118.2 pounds in 1891–95 to 124.7 pounds in 1916–20. A lack of regularity in the growth of lung capacity was attributed to the changes in the types of spirometers and to defects in these instruments. The mean age of the students had declined from 19.0 years in 1891–95 to 18.2 years in 1916–20. (Mabel Newcomer, "Physical Development of Vassar College Students, 1884–1920," this JOURNAL, Vol. XVII, 1921, pp. 976–982.)

Another study of physical development, made by Gordon Bowles in 1932, includes a comparison of the heights and weights of mothers and daughters from Wellesley, Vassar, Smith, and Mount Holyoke. The mean height of the daughters was 2.93 centimeters greater than that of their mothers, and their mean weight exceeded that of their mothers by four pounds. The average age of the mothers at the time of measurement was 18.76 years, while the average age of the daughters was 17.88 years. (Gordon Bowles, *New Types of Old Americans at Harvard and at Eastern Women's Colleges*, Harvard University Press, Cambridge, 1932, pp. 95–133.)

[4] The significance of the difference between the two means was tested as follows:

The standard error of the difference between the two means was computed by the formula:

$$\sigma_{\bar{X}_1 - \bar{X}_2} = \sqrt{\frac{\sigma_1^2}{N_1 - 1} + \frac{\sigma_2^2}{N_2 - 1}}.$$

The difference between the two means, expressed in terms of the standard error of the difference between the two means, was interpreted as a normal deviate.

A one per cent level of significance was used.

developed the right hand more than the left for right-handed girls. To compensate for left-handedness the arithmetic mean of the stronger grip was computed also. Although the difference between the means of stronger grip is slightly less than the difference between the means of right grip, the difference is as significant because of the greater uniformity in stronger grip in each year.

The freshmen entering in 1943 were younger than those entering in 1918. The average age of the 250 girls in 1918 was 18.4 years while the average age of the 308 girls in 1943 was 17.9 years. A negligible correlation between age and each of the four measurements in both years is indicated by the small values of the coefficient of correlation shown in Table II. The coefficient of correlation differs significantly from zero

TABLE II

CORRELATION BETWEEN AGE AND FOUR MEASUREMENTS FOR 250 FRESHMEN IN 1918 AND 308 FRESHMEN IN 1943 AT MOUNT HOLYOKE COLLEGE

Measurement	Coefficient of correlation	
	1918	1943
Age and weight	−.114	+.035
Age and height	−.060	−.044
Age and lung capacity	+.055	−.008
Age and stronger grip	−.095	+.176

only in the correlation[5] between age and stronger grip for 1943. The lack of significant correlation with age in every case except that of stronger grip in 1943, and the positive correlation in that case, indicate that the increase in size and strength cannot be explained by the difference in age.

The distribution of freshmen by birthplace in Table III shows a different representation of geographical regions within the two classes. The most important change is the decreased percentage coming from New England and the increased percentage from the Middle Atlantic States. In order to discover whether this shift in geographical origin could account for the greater size and strength of the 1943 freshmen, the measurements of the freshmen born in New England were treated separately. The arithmetic means and standard deviations, shown in

[5] The significance of the difference between r and zero was determined as follows:
The standard error of r was determined by the formula:

$$\sigma_r = \frac{1}{\sqrt{N-1}}.$$

The difference between r and zero was expressed in terms of the standard error of r and treated as a normal deviate.
A five per cent level of significance was used.

TABLE III

GEOGRAPHICAL DISTRIBUTION OF FRESHMEN ENTERING MOUNT HOLYOKE IN 1918 AND 1943

Birthplace	1918		1943	
	Number	Per cent	Number	Per cent
New England	109	43.6	91	29.5
Middle Atlantic	93	37.2	139	45.1
Other regions of the United States	37	14.8	59	19.2
Foreign	6	2.4	14	4.6
Not recorded	5	2.0	5	1.6
Total	250	100.0	308	100.0

Table IV, were calculated from frequency distributions of each measurement of the 109 New England freshmen of 1918 and the 91 New England freshmen of 1943. The arithmetic mean of each measurement of the New England freshmen of 1943 exceeds[6] that of the New England freshmen of 1918. It is unlikely, therefore, that geographical changes could have explained the differences shown in Table I.

TABLE IV

ARITHMETIC MEANS AND STANDARD DEVIATIONS OF PHYSICAL MEASUREMENTS OF 109 NEW ENGLAND FRESHMEN IN 1918 AND 91 NEW ENGLAND FRESHMEN IN 1943 AT MOUNT HOLYOKE COLLEGE

Measurement	Arithmetic mean		Standard deviation	
	1918	1943	1918	1943
Height (centimeters)	162.3	164.2	6.2	5.7
Weight (pounds)	117.5*	126.7*	14.5	16.1
Lung capacity (liters)	2.6	3.2	.42	.47
Right grip (kilograms)	29.7	32.1	4.9	5.3
Left grip (kilograms)	28.5	29.8	4.8	5.1
Stronger grip (kilograms)	30.5	32.6	4.4	5.2

* Exclusive of garment weighing one-half pound.

In the absence of any indication that the true explanation of the increased measurements is based on age or geographical origin, the answer must be sought elsewhere. Possible contributing factors, beyond the scope of this study, are better nutrition, better infant care, less restrictive clothing for women, increased participation on the part of more students in physical activity and greater interest in physical fitness.

[6] The differences are significant for all but height and left grip when a one per cent level of significance is used. The difference in height is significant with a five per cent level of significance. Left grip shows a less significant difference.

APPRAISAL OF THE U. S. BUREAU OF LABOR STATISTICS COST OF LIVING INDEX: APPENDIX*

PREPARED FOR A SPECIAL COMMITTEE OF THE AMERICAN STATISTICAL ASSOCIATION†

OUTLINE

General Description of the Index
- Definition
- Population groups represented
- Formula
- Selection of weights and items
- Development of specifications
- Cities included in the sample
- Collection and number of prices

Appraisal of the Methods of Obtaining Prices and Price Relatives
- Selection of the sample of outlets
- General description of method of pricing
- Variability of prices among outlets
- Special tests of the price reports
  - Additional sample of stores
  - Prices from chain store outlets
  - Prices paid by purchasers
- Comparison of price reports with ceiling prices
- Use of specifications in obtaining retail prices in the war period

Appraisal of Methods of Deriving and Adjusting Weights
- General description
- Changes made in the recent period
- Effect of changes in weights on the movement of the index
- Effect of complete weight revision

Appraisal of the City Sample

Comparison of BLS Index with Other Indexes
- State indexes
- National Industrial Conference Board indexes

The Index as Representative of Broader Population Groupings

Indexes for Different Regional or Industrial Groups

Indexes for Different Income Groups

Place-to-Place Comparison of the Cost of Living

* For the Report itself see this JOURNAL, December 1943, pp. 387–405. Because of the urgency of the task confronting the Committee and the limited availability of data and statistical facilities, the Appendix is not so full or balanced as would be desired. It is felt, however, that the material collected here will contribute to an understanding of the scope of the Bureau's cost of living index and to a critical appreciation of its accuracy.

† By Dorothy S. Brady, Bureau of Human Nutrition and Home Economics, and Solomon Fabricant, National Bureau of Economic Research, with the assistance of the staff of the U. S. Bureau of Labor Statistics.

GENERAL DESCRIPTION OF THE INDEX

Definition. The cost of living index prepared by the Bureau of Labor Statistics is an answer to the question, "How much has the cost of living changed?" This question as stated is not specific and before an index can be computed, a precise definition of the term "cost of living" is needed. Thus, families do not live at the same income level each year; some receive additional income, others have less. If the question "How much has the cost of living changed?" is defined to mean how much have living costs changed when only the effect of changes in prices is considered, then changes introduced by variations in income are ruled out. The Bureau of Labor Statistics has arrived at the procedures used in computing its cost of living index by assuming that the question of "how much living costs have changed" can be answered by measuring the changes which would have occurred in a family's cost of living if it had purchased the same goods and services in two periods. The index then is a measure of the changes in the cost of a bill of goods and services consisting of identical quantities and similar qualities in any two successive periods in given amounts. This is not the only possible definition that could be adopted. It is, however, the one most widely used for indexes of this type and the most suitable for practical computation, given the present collections of data on consumer behavior and our knowledge of economic laws.

Population groups represented. The index of the cost of living computed by the Bureau of Labor Statistics measures the changes in the cost of goods and services purchased by specific groups in the population described as families of "wage earners and lower-salaried clerical workers in large cities." The commodities and services included in the index, their weights and specifications, the cities covered, and the sample of stores within cities were all selected with recognition of this restriction in population coverage. The index does not purport to be representative of other groups in the population, such as single individuals, however employed, families of business and professional men, or families living on pensions or relief allowances, nor does it take account of changes in the cost of living of families migrating to large cities from rural communities or from other cities.

Formula. The cost of living index is based on the formula of Laspeyres:

$$R_i = \frac{\sum q_o P_i}{\sum q_o P_o}. \tag{1}$$

Where the q_o are the average quantities of each item used by the

families in the wage earner and clerical group in the base period, the P_o are the prices for these items in the base period and the P_i the prices for the ith period. A measure of the quantities q_o was determined from an expenditure study in the initial period and the P_i's are obtained by a collection of prices during each period for which the index is computed.

In practice the index is calculated from the formula:

$$R_i = R_{i-1} \frac{\sum q_o P_{i-1} \dfrac{P_i}{P_{i-1}}}{\sum q_o P_{i-1}} \tag{2}$$

which is equivalent to (1). In this form the index is expressed as a weighted average of the price relatives for each commodity, the weights being the "cost" $q_o P_{i-1}$, in the previous period. The product of this average and the index for the previous period gives the value of the index for the given period. The weights, $q_o P_{i-1}$, used in calculation are called the "cost weights" and change from period to period with changes in prices. The index as calculated may be expressed most simply as

$$R_i = R_{i-1} \sum e_{i-1} r_i \tag{3}$$

where e_i is the cost weight expressed as a proportion of the total costs and r_i the price relative for a given commodity or service and R_i is the index for the ith period.

Precision of measurement both in the weights and in the prices is of importance, but in general an index is affected less by errors in the weights than by errors in the prices. Errors in the weights as expressed in formula (3) must be both positive and negative with a sum of zero,[1] whereas errors in the prices may all be in one direction. The movement of the index may, however, be significantly influenced by changes in the weights for particular items if such changes are associated with the price changes.

Selection of weights. The weights for the commodities and services in the present index were derived from studies of the expenditures of wage earners and clerical workers made in 1934–36, described below. From the 578 items of family expenditures recorded separately on the schedule, 198 were selected for the index on the basis of two criteria: (1) importance in the family budget, and (2) correlation in the price movements of related commodities.

[1] Weights represent a distribution of the importance of each item usually in percentage terms totalling 100. Understatements in any one item, therefore, must be offset by overstatements in another.

For each item selected for the index, the expenditure weight was determined by adding together the average expenditures for the article itself, the average expenditures for similar items known to have the same price movement, and the proportionate share of the miscellaneous expenditures of the same consumption group. For example, the expenditure weight for studio couches was the average expenditure for studio couches, other couches, day beds, and davenports; a relative part of expenditures for miscellaneous furniture; and a relative part of the expenditure for articles of housefurnishings itemized on the survey schedule as "other housefurnishings expense."

The method of allocating the weights to the items included in the index is explained in detail in the Bureau of Labor Statistics Bulletin No. 699: *Changes in Cost of Living in Large Cities in the United States, 1913–41*. The details for the food group, for example, are given in Table 6 of that Bulletin and those for clothing in Table 10.

Development of specifications. In order to standardize its measurement of price changes, the Bureau has developed descriptions or "specifications" for most items in the index. Each specification represents, in the opinion of commodity experts and specialists in industry and the various trades, the article most frequently purchased in the price lines in which wage earners and clerical workers were concentrating their purchases in 1934–36. Each article is described in terms used in the trade, and details of construction are given in order that the article may be readily identified. For clothing, the fabric, stitching, size ranges, style, and other features are stated. For furniture, the kind of wood, finish, construction, metal fixtures, and other details are fully described.

Since these descriptions are designed primarily for the collection of prices on the same qualities in many cities from time to time, some range in construction details is allowed in order that prices may be obtained on goods sold in different parts of the country. Thus, although the specifications are detailed, more than one type, quality, or price level may satisfy a given specification. In the usual practice, the quality satisfying the specification and selling in largest volume is selected in each outlet giving price information, and this choice is followed throughout the period during which the particular specification is used for that outlet.

Because of changes in manufacturing processes, kinds of materials available, style, etc., certain specifications become outmoded, the length of the period for which they are valid varying for the different groups of merchandise. The specifications for such articles as winter clothing need to be modified about every two years in normal times, and in wartime even more frequently. The new specification is made to

adhere as closely as possible to the one used in the previous periods in respect to such fundamental characteristics as materials and design.

Cities included in the sample. The national cost of living index representing large cities is based on price data collected in three samples of cities most of which are over 100,000 population. For each quarterly period (March, June, September, and December) the index is calculated by combining the national food-cost index, which is based on changes in food prices in 56 cities, and the indexes of prices of other important goods and services in 34 out of the 56 cities. For the other 8 months of the year the index is calculated on the basis of food prices in 56 cities and the prices of an abbreviated list of other commodities and services in 21 of the 34 cities. This monthly index was begun in 1940.

Collection and number of prices. Prices for the items chosen for the index and described by the specifications are collected by agents of the Bureau from a sample group of the stores in each city included in the index.

The goods and services priced for the index are selected to represent the typical purchases of wage earners' families. They are changed as required by normal market developments as well as by wartime conditions. In June 1943 the total list of articles had been reduced from the 198 included, on the basis of the family expenditures survey in 1934–36, to 183. This total list of 183 items included prices of 59 foods, 43 articles of clothing, 12 kinds of fuel, 23 kinds of housefurnishings, and 46 miscellaneous goods and services. Two or more qualities are priced for most articles of clothing and housefurnishings and for some of the commodities in the other groups. Altogether, therefore, prices of 342 different articles and qualities are obtained for the official cost of living index in each city. For the inter-quarterly monthly indexes a somewhat smaller number of articles is priced.

Foods: Food prices for the food-cost index are obtained for all staple foods, such as bread, butter, potatoes, etc., in 56 cities. They are obtained in these cities from 1,129 independent grocery stores and markets, 208 chain organizations, 152 dairies, and 340 bakeries. The 208 chains represent 8,640 stores, making a total of 10,261 outlets represented.

Clothing: The clothing priced represents those items usually purchased by city wage earners' families, including men's suits, work clothing and shirts, and women's dresses, hose, coats, shoes and various accessories. Clothing for infants and most articles for boys and girls are not included.

Housefurnishings: Living room and dining room suites, mattresses, bed springs, stoves, washing machines, sheets, glassware, etc., represent the furniture and furnishings which are priced for this group in the index. It is in this group of articles that most changes have occurred since the beginning of the war period.

Fuel, electricity and ice: As indicated above, 12 different kinds of fuels

are priced. Special emphasis is placed on those fuels which are of importance in each locality. Typical bills for gas and electricity are computed from the rate schedules obtained from utilities in the large cities.

Miscellaneous goods and services: A large variety of goods and services purchased by the average family in the wage-earner and clerical group is priced. These include such diverse commodities as drugs, automobiles, and tires; and such services as medical and dental care, and hair cuts.

Rents: Since September 1942 rents have been gathered directly from tenants. More than 1,500 dwelling units are surveyed in a typical large city every quarter. Prior to the middle of 1942 rents had been based upon reports for identical dwelling units, obtained from rental management agencies.

Altogether, more than 145,000 price quotations are obtained for calculating the cost-of-living index each quarter.

As noted, since the outbreak of the war many articles have, of necessity, been dropped from the list and others have been added. Most important of those dropped were automobiles and tires, electric refrigerators and other durable household equipment, and certain textile products—notably silk hose. Substitutes for some of these were added, such as wartime models of furniture, and rayon hose. Some foods, such as hamburger, liver, and rolled oats, have been added because of their wartime significance.

APPRAISAL OF THE METHODS OF OBTAINING PRICES AND PRICE RELATIVES

Selection of the sample of outlets. Since the index measures the trend of prices of goods purchased by wage earners and lower-salaried clerical workers, the stores selected for the sample are taken as representative of the outlets patronized by such families. For the collection of food prices independent outlets are chosen from districts in the city proper (not including suburbs) where the residents are chiefly wage earners and lower-salaried clerical workers. Such districts are selected on the basis of local information relating to general rent level, location of plants and factories, and the concentration of racial groups. The individual food stores in the sample are chosen so that the number from each sales-volume group is proportional to the total sales of that group. As shown by data of the Bureau of the Census, the sales-volume groups are as follows: sales of less than $20,000 per year; $20,000 and under $50,000; $50,000 and under $250,000; and $250,000 and over.

Retail food prices are collected from the same stores at each pricing period. When a store is dropped from the sample for any reason, a replacement having the same type of operation is chosen from the same neighborhood and the same sales-volume group.

All important grocery chains within the corporate limits of the city

are included in the sample, and if more than one type of store is operated by a particular chain, prices are secured from each type having different selling prices. The prices from chain and independent stores are combined by use of weights, based on the total sales for the two types of organization as reported by the Bureau of the Census and the BLS-OPA "Food Margin" Survey of 1942. Prices from the individual corporate chain organizations are weighted according to each organization's annual sales in each city as reported by each firm to the Bureau.

The outlets from which retail prices of other goods have been priced have been selected on the basis of size and kind of outlet, type of operation, quality of commodities sold or services rendered, and location and clientele. Both department and specialty stores are included in the store samples, as well as national, sectional, and local chains, and independent stores. Outlets selling commodities or rendering services on a cash and carry basis are represented as well as those granting regular credit and delivery service or installment credit. Stores operated by mail-order houses are included in the Bureau's sample in those cities where they are situated.

For each article other than food, price quotations are obtained from at least 5 stores in New York City and at least 4 stores in other cities. Some stores visited supply prices for just one article, others for several articles, but only a few stores are able to give prices for all of the articles in a commodity grouping as described by the specifications. Thus, in most cities it is necessary to visit 10 or more stores in order to obtain at least four quotations for each article priced in the clothing group.

General description of the method of pricing. Most of the prices used in the calculation of the Bureau of Labor Statistics cost of living index are obtained by trained representatives through personal interviews with store managers or buyers. As a rule, the only data not obtained by personal call are prices of household fuels and rates for electricity and gas. Retail fuel prices are reported on questionnaires mailed directly to the dealers, and all data on rates for electric current are obtained from the Federal Power Commission. Gas rates are obtained from the utility companies by mail.

In stores where prices are regularly posted in full view of the customers, the representative obtains price data by personal inspection of the posted prices and checks these with proprietors or managers. If prices are not posted, the representative fills out the schedule by questioning the manager. Whenever possible, merchandise and price tags are examined.

In the collection of prices of foods as well as of other commodities, in order to maintain comparability each representative is provided with

a set of records which gives the brand, lot number, or grade (where it is available) and other identifying information relative to the prices obtained during previous months, as well as the general "specifications" described above. If the same brand or quality is no longer available, the representative substitutes a new one and obtains the previous period's price for the substitute. By having prices for earlier months readily available, the representative can determine whether the substituted item was of the same general price level in the previous month as the item no longer stocked by the reporting store.

All data for the cost of living index are published as referring to the middle of the month. Food prices are collected each month and apply to the Tuesday nearest the fifteenth; collection may, however, be made on the preceding Monday or the following Wednesday. Collections of data for items other than food are usually made in the two weeks preceding or the week following the date to which the index applies. For the monthly index, an abbreviated list of commodities and services is priced. The full list is priced at three-month intervals.

Variability of prices among outlets. The Bureau has not in the past calculated measures of the dispersion of prices among outlets on the basis of which the sampling errors of the average prices and of the price relatives could be estimated. In March 1943, the Bureau began to include in its monthly release "Retail Food Prices by Cities," the ranges of food prices (that is, the highest and lowest prices reported for each food) in all of the cities included in the food-cost index. These published data are not adequate, however, for computing statistical measures of variability. The calculation of the standard deviations of the prices of a few selected foods in Detroit indicates that the standard errors of the average prices for the foods, when based on 15 to 20 quotations, are all probably less than 1 cent and most are less than half of a cent.

To judge whether the Bureau's sample of stores is representative of those where wage earners buy and to evaluate the accuracy of the regular price reports, the Committee developed three special tests described in the following section.

Special tests of the price reports. **(1) Additional samples of stores.** In June 1943 the Bureau of Labor Statistics, at the request of this Committee, conducted experimental tests designed to provide some information that would lead to an evaluation of the price data collected. In the first of these tests, a sample of independent food stores (within the corporate limits of the city), in addition to the Bureau's regular sample, was chosen in accordance with criteria set by the Committee staff. The prices of foods were obtained in the same way and on the same day that the Bureau of Labor Statistics representatives obtained

the prices for the regular sample. This test was conducted in 6 cities: Washington, Detroit, Milwaukee, Atlanta, San Francisco, and Scranton. A second additional sample of stores was chosen from the suburbs of 4 of the cities: Washington, Detroit, San Francisco, and Milwaukee. In July, price reports were obtained from the stores included in the additional samples in Washington, Detroit, and San Francisco.

In choosing the stores for this test, the recent Census publications giving block statistics for cities of 50,000 or more population made it possible to delineate the districts to be sampled more directly and objectively than was possible when the regular samples of reporting stores were chosen. Areas in which the average rent or rental value of dwellings in each block was not less than $15 and not more than $50 were considered districts in which wage earners and lower-salaried clerical families live. The selection of this range of average rent was based on the distribution of rents paid by wage earners and lower-salaried clerical workers included in the sample of urban families surveyed in the 1941 expenditure study.[2]

In the suburbs a similar sample was chosen to test whether the level of prices there differed significantly from that in the city proper, to which the Bureau reports are limited. Here an additional criterion was used in defining the districts to be included in the sample. The commuting fare in the districts chosen was restricted to not more than twice the fare on public transportation within the city limits.

All food stores on streets within the districts selected were listed and from these lists every nth store was selected, n being determined so as to yield the same number of stores as are in the regular sample.

Most of the differences between the averages from the additional samples and those from the regular sample were less than 5 per cent but there was a majority of cases in which the averages from the regular sample exceeded those from the additional samples. The suburban samples differed no more from the regular sample than did the additional sample within the city limits. If the differences between the two samples within the city limits can be explained, it may be concluded that the regular sample is representative of the level of prices in the whole metropolitan area in which the wage-earner families live and buy their food.

Weighted aggregates of the prices reported in the additional samples were below the corresponding aggregates of the regular sample in 5 of the 6 cities. The difference averaged 1.7 per cent. The smallest discrepancy (0.6 per cent) was in Milwaukee where, as exception to the gen-

[2] Bureau of Labor Statistics Bulletin No. 724: *Spending and Saving of City Families in Wartime.*

eral rule, food costs averaged somewhat higher in the additional stores than in the Bureau's regularly reporting stores. Prices in the additional sample within the city limits were 1.5 per cent below the prices in the regular sample in Detroit; 2.0 per cent in San Francisco; 2.1 per cent in Washington and Scranton; and 4.8 per cent in Atlanta. This repetition of similar discrepancies in five out of six cities would not be expected on the basis of sampling alone. It is therefore necessary to conclude that the regular samples and the additional samples differed systematically in some respect.

TABLE I

FOOD COSTS IN ADDITIONAL SAMPLE IN 6 CITIES RELATIVE TO FOOD COSTS IN REGULAR BLS SAMPLES, JUNE 1943

Price from regular BLS sample in city proper = 100
(Based on additional samples of prices in stores within city limits)

Commodity	Detroit	Milwaukee	San Francisco	Washington, D. C.	Atlanta	Scranton	Average of 6 cities
All foods	98.5	100.6	98.0	97.9	95.2	97.9	98.3
Cereals and bakery products	98.4	100.9	98.6	99.5	101.4	98.1	99.1
Meats	97.1	99.3	97.8	95.6	88.2	94.7	96.2
Dairy products	101.0	100.2	100.8	99.8	101.7	99.7	100.7
Eggs	97.9	100.6	99.0	98.6	94.9	96.7	98.3
Fruit and vegetables	98.3	101.6	95.6	98.7	96.5	99.4	98.0
Fresh fruit and vegetables	98.9	101.7	94.7	98.9	96.2	100.1	98.2
Canned fruit and vegetables	94.4	100.7	102.3	98.0	94.9	94.7	97.2
Dried fruit and vegetables	93.0	100.0	100.5	97.8	106.9	99.3	97.0
Beverages	98.9	104.6	100.6	100.5	94.3	97.8	99.6
Fats and oils	98.1	99.9	99.1	95.9	96.4	100.2	98.0
Sugar and sweets	98.7	101.0	100.6	97.3	98.2	99.3	99.1

Note: Weighted aggregates were calculated by multiplying the average price for each commodity in the additional sample by the revised (March, 1943) consumption weights for commodity in each city and showing them relative to the Bureau's averages for its regular sample as 100. The few commodities for which fewer than five quotations were available in either sample were not included in the comparison.

Two possibilities must be considered to explain a systematic difference between the samples: First, that the regular samples yield an overestimate of the average prices of the commodities reported; and second, that the additional samples gave underestimates of the prices of foods, individually and in the aggregate. The first of these explanations implies either that the stores in the regular sample include a disproportionate number with relatively high prices or that a tendency has developed for the stores to report on lines of foods with higher prices than the average for the specification ranges. The latter hypothesis can be verified to some extent by a study of the brand distribution of the price reports for the canned and packaged foods.

The stores reporting to the Bureau in each of the samples were asked to give prices for the "best-selling" brands. In the regular sample the brands reported as "best-selling" over a period of time tend to be mainly those having a wide national or regional distribution. In a given month, particularly in a time of shortages, packers' label brands may be more widely sold by retailers as was indicated by a large proportion of stores in the additional samples reporting prices on such brands. When the average prices of a few foods were tabulated by brand, the additional samples and the regular sample were in close agreement. For example, the average price of a nationally advertised

TABLE II

FOOD COSTS IN SUBURBAN SAMPLES IN 4 CITIES RELATIVE TO FOOD COSTS IN REGULAR BLS SAMPLES, JUNE 1943

Price from regular BLS sample in city proper = 100
(Based on additional samples of prices in stores in suburban areas)

Commodity	Detroit	Milwaukee	San Francisco	Washington, D. C.	Average of 4 cities
All foods	97.2	100.8	98.8	99.0	98.3
Cereals and bakery products	98.2	101.2	96.0	98.9	98.1
Meats	96.1	97.6	98.9	97.6	97.2
Dairy products	100.5	100.6	102.1	100.2	100.8
Eggs	97.7	100.6	99.6	102.5	99.3
Fruit and vegetables	94.9	103.5	97.3	99.7	97.3
Fresh fruit and vegetables	94.9	103.6	97.1	99.8	97.2
Canned fruit and vegetables	95.2	101.4	100.1	99.5	97.9
Dried fruit and vegetables	95.5	104.2	94.0	98.0	96.5
Beverages	99.2	107.0	100.2	101.1	100.7
Fats and oils	97.4	100.6	101.7	98.0	98.7
Sugar and sweets	99.3	99.8	102.0	96.6	99.6

Note: Weighted aggregates were calculated by multiplying the average price for each additional sample by the revised (March, 1943) consumption weights for each city and showing them relative to the Bureau's averages for its regular sample as 100. The few commodities for which less than five quotations were available in any sample were not included in the comparison.

brand of macaroni in the Detroit regular sample was 20.1 cents; in the additional sample within the city limits 19.4 cents and in the suburban sample 19.2 cents. Nearly all of the reports in the regular sample were for this brand, while more than half of the stores in the additional samples reported other and less expensive brands. As a result the average price for all brands in the regular sample amounted to 19.4 cents, and to 14.8 cents in the two additional samples.

It thus appears quite probable that in the case of the canned and packaged foods, the difference between the regular and the additional samples was in the distribution of the reports among the different brands. Only a comprehensive study of the volume of sales of each food defined by the specification would give the basis for judging whether

the regular sample yields a representative distribution among brands over a period of time. It is apparent from the example given above that in a given month this distribution may be quite unrepresentative of the brands on grocers' shelves. An interesting problem is raised by these considerations: Should the distribution of price reports each month conform to the particular frequencies existing at that time? If so, not only the price reporting but also the calculation of price changes would be made much more complicated and expensive. If, on the contrary, it is considered theoretically desirable to achieve a distribution that is representative of the sales by brands over a longer period, such as 6 months or a year, then it may be expected that any new sample in times like the present would differ from the regular sample as in this experiment.

The differences between the regular and the additional samples were not limited to the canned and packaged foods. In most of the meats and in some of the fresh vegetables and fruits also, the average prices reported by the stores in the regular sample were higher than the average prices in the stores in the additional samples. For these foods it is reasonable to assume that in the additional samples there were few or no prices reported above ceiling prices. As noted elsewhere, the stores in the regular sample report prices above the established ceilings sufficiently often to raise the average price as much as the differences under consideration. Since the owners or managers of the stores in the additional samples could easily have misunderstood the nature and purpose of the inquiry on the part of Government representatives with whom they had had no previous acquaintance, it is not unlikely that in most cases the prices reported were less than or equal to the ceiling price.

The chief function of the collection of retail prices is to measure the price changes over a period of time. Therefore, a comparison of the results from the additional samples in the three cities where the data were collected in both June and July offers the most significant test of the city samples. An index of the change in food costs was calculated, using exactly the same procedures for each of the three samples. The decrease during this period resulted from the seasonal decline in fresh fruits and vegetables and a lowering of some ceiling prices by the Office of Price Administration.

	Change in the Cost of Foods from June to July 1943 in		
	Detroit	*San Francisco*	*Washington, D.C.*
Regular sample	−1.7	−4.4	−1.4
Additional samples:			
City proper	−1.5	−3.7	−3.4
Suburbs	−0.7	−4.3	−1.8

The differences between the regular sample and the additional sample within the city proper for San Francisco and Washington suggest a margin of variation larger than is desirable in the index series even though they can, by means of statistical tests, be attributed to sampling fluctuations. The question, therefore, arises whether the number of stores in these samples is large enough to yield a measure of relative change in price that would not, in general, vary as much from sample to sample. The price changes for separate foods in the three samples were in general agreement when they were based on 20 or more quotations. Over half of the changes for the three samples, however, had to be measured from a smaller number of reports. Less than 10 quotations in the Detroit suburban and Washington additional city sample were obtained for more than one-third of the foods (Table III). Even though

TABLE III

DISTRIBUTION OF FOOD PRICES COLLECTED IN 3 CITIES, BY NUMBER OF QUOTATIONS SECURED FOR EACH FOOD, IN THE BLS REGULAR SAMPLE AND IN TWO ADDITIONAL SAMPLES—JUNE 15 AND JULY 15, 1943

City and sample	Number of foods for which the following number of quotations were obtained					
	Less than 5 quotations	5–9 quotations	10–14 quotations	15–19 quotations	20–30 quotations	Total quotations
Detroit:						
Regular sample	6	5	11	15	20	57
Additional sample (city)	8	17	12	7	12	56
Additional sample (suburbs)	18	3	12	10	14	57
San Francisco:						
Regular sample	4	4	7	20	25	60
Additional sample (city)	6	14	3	5	31	59
Additional sample (suburbs)	6	13	6	2	32	59
Washington, D.C.:						
Regular sample	5	5	4	11	36	61
Additional sample (city)	10	12	3	5	31	61
Additional sample (suburbs)	7	5	12	2	35	61

the weight of a single food is small, the composite effect of a large sampling error in a substantial number of price relatives can apparently lead to a large variation in the weighted aggregate. At the present time, the prevalence of shortages has intensified this problem. It thus appears that in order to keep at a minimum the variation in the measure of relative price change in individual cities, it may be necessary for the Bureau of Labor Statistics to add temporarily to its sample of independent stores. It should be noted, however, that the measure of price change in independent stores forms only part of the total estimate of

change. If the change is more accurately measured for chain stores, the error is obviously less than indicated in this comparison.

(2) Prices from chain-store outlets. The Bureau regularly collects chain-store food prices from district or local headquarters of the predominant chains in each city or from a single store designated by the headquarters. The various chains consented to a test in which the prices reported by central offices were checked against the actual prices being charged in a sample of the chain outlets in the city. This test was to ascertain whether the prices charged in the individual chain outlets center around the approximate price scale established by the chain headquarters. In all 6 cities, 78 per cent of the prices reported by the individual outlets were the same as the prices reported by the chain

TABLE IV

DISTRIBUTION OF INDIVIDUAL CHAIN STORE PRICES IN RELATION TO PRICES REPORTED BY CHAIN HEADQUARTERS AND PERCENTAGE DIFFERENCE BETWEEN FOOD COST AGGREGATES BASED ON AVERAGES OF INDIVIDUAL STORE PRICES AND ON CENTRALLY REPORTED PRICES, JUNE, 1943

City	Total number of comparisons	Percentage of individual store prices			Percentage difference between food cost aggregates*
		Same as headquarters prices	Lower than headquarters prices	Higher than headquarters prices	
Atlanta	1,560	72	11	17	+0.1
Detroit	3,335	75	10	15	+1.0
Milwaukee	1,121	74	9	17	+1.7
San Francisco	1,701	89	6	5	−0.6
Scranton	1,255	77	13	10	−0.1
Washington, D. C.	1,394	79	6	15	+1.1
All cities	10,366	78	9	13	+0.6

* The average prices for the different foods were combined with the weights used in calculating the index.

headquarters (Table IV). In 4 of the cities, there were more prices in the individual stores above the headquarters price than below; in two cities, San Francisco and Scranton, the reverse was the case. The comparison is best summarized in the percentage difference between the food cost aggregates obtained combining the average prices for each food with the weights used in calculating the index. The average prices reported by the individual stores resulted in aggregates that ranged in the 6 cities from 0.6 per cent below to 1.7 per cent above the aggregates based on the average prices reported by the central offices.

(3) Prices paid by purchasers. The third test was a comparison of prices secured by the Bureau's representatives with prices actually paid

by purchasers. A special group of Bureau of Labor Statistics agents unknown to the Bureau's regular respondents was provided with funds and ration points and instructed to buy certain items from the regular list of commodities in 12 cities. The purpose of this test was to discover whether there was any tendency on the part of store managers interviewed regularly by the Bureau's representatives to report prices differing systematically from those charged their customers on the same date. The agents making the purchases were provided with a list of the brands and specifications of foods priced in May in each of the stores included in the test. These agents were not the agents who regularly visit these stores. They were expressly selected for this job and went to the stores as ordinary customers and were in no way identified as Government employees. These agents were strangers in the stores and might therefore be subject to any differential treatment that the retailer may accord to different groups among his patrons.

After the purchases were made, the shopper requested a receipt from the person serving him. This receipt did not as a rule record prices for the individual foods, grades, or qualities of the foods purchased. After the shopper had left the store he prepared a report showing, by store name and outlet number, the foods purchased, the quantity of each, the total cost, and the stated price per unit. The amount for each article in general appeared on the receipt, but the other quantitative information had to be supplied from memory. Brands and grades were recorded for canned and packaged goods. The shopper had no definite assurance that the retailer had supplied him with the grade of meats requested and, therefore, no quality information was listed for the meats.

The purchase reports were then compared with the price reports obtained from the regular monthly interview with the owner or manager of the store. Prices paid tended to be above prices reported for items in the meat, fresh fruit and vegetable groups. In other foods the prices paid by purchasers and the prices reported to agents were in substantial agreement. The magnitude of the differences is illustrated by the unweighted averages of the prices of 24 foods in the 12 cities.

If a purchaser bought the list of foods purchased in this test and if the test purchase prices had been combined with the weights used in the cost of living index in June, his bill would have been 1.7 per cent greater than that calculated from the prices reported to the Bureau.

This simple comparison, however, does not describe the situation accurately because subsequent analyses by the Committee's staff have shown that the list and quantities of foods purchased were not strictly comparable with those regularly priced. If allowance is made for these

differences and a similar grocery bill is calculated with the weights used in the cost of living index, the difference is only 1 per cent. In detail, analysis indicated that when the differences between the prices paid and the prices reported were appraised food by food and store by store, certain reports on purchases were eliminated from the comparison because the grade or brand differed from that shown on the regular price

Item and unit	Averages of reported prices (*cents*)	Averages of purchase prices (*cents*)
Flour, wheat, 5 lbs.	33.5	33.6
Macaroni, 8 oz. pkg.	8.7	8.7
Corn flakes, 11 oz. pkg.	9.9	10.0
Rolled oats, 20 oz. pkg.	11.8	11.7
Round steak, 1 lb.	48.9	50.3
Chuck roast, 1 lb.	33.5	35.4
Veat cutlets, 1 lb.	54.7	55.2
Pork chops, 1 lb.	42.8	42.9
Bacon sliced, ½ lb.	23.7	23.8
Ham sliced, 1 lb.	59.4	59.5
Milk, evaporated, 14½ oz.	10.4	10.4
Cabbage, 1 lb.	10.2	10.4
Carrots, bunch	8.4	8.7
Potatoes, 1 lb.	5.6	5.8
Peaches, #2½ can	26.4	26.9
Pineapple, #2½ can	32.4	32.4
Grapefruit juice, #2 can	14.8	14.9
Beans, green, #2 can	15.8	16.0
Corn, #2 can	15.0	15.1
Peas, #2 can	15.4	15.4
Tomatoes, #2 can	13.8	13.8
Navy beans, 1 lb.	11.1	11.3
Salad dressing, 1 pt.	27.3	27.6
Corn sirup, 24 oz. bottle	16.3	16.5

report. The best-selling brand within the specification had shifted in some retail stores and in accordance with the established practice the price reporters had obtained the price for a different brand in June, and a new May price for the same brand. There was, accordingly, no June report for the brand bought by the shopper.

The other differences between prices paid and the prices reported were then appraised in terms of the possibility of errors in the shopper's reports on quantity purchased and grade or brand received. For example, a shopper's report of the purchase of 2½ pounds of chuck roast for 85 cents was considered consistent with a price of 35 cents a pound, since the weight recorded was doubtless a "rounded" estimate. Forty-seven per cent of all the differences between the pairs of prices could be

explained by the purchase of a different grade from that priced or by inaccuracies in the reported quantities. The relatively large number of such cases accents the difficulties of using reports of purchases as a method of recording prices and price changes.

Out of a total of 809 comparisons there were, after editing for comparability, 97 cases which might be considered indicative of errors in the regular price reports. Most of these differences, particularly those in which the purchase price exceeded the reported price, occurred in foods for which the retailer had been reporting the same price for two or more months. This suggests that a few of the regular reporters may fall into the habit of reporting no changes in many of their prices, in order to shorten the interview. This inference is further supported by the fact that such cases tended to be concentrated in certain stores. With the increasing difficulties that retailers are facing in the conduct of their business, there may be an increase in the number of retailers regarding the monthly price report as a chore to be completed as quickly as possible.

The Bureau has continuously revised its sample of stores in each city and at the present time is directing the revisions so that the distribution of the stores in the sample conforms to the distribution shown by the Census for sales-volume groups. Substitutes are being introduced for stores that appear not to be giving completely accurate reports.

Comparison of price reports with ceiling prices. At the present time, a new type of question on the accuracy of the price reports has been raised: Do the respondents report the actual selling prices or the legal (ceiling) prices? To investigate this problem, a comparison has been made of the prices reported and ceiling prices of five pork products at selected dates in the stores in 56 cities. The results of this study, presented in Table V, show that 25 per cent of the prices quoted to the Bureau as of April 20 were above the dollar and cents ceilings established on April 1. These percentages state number of price quotations above ceiling prices in relation to the total number of price quotations collected by the Bureau. They do not provide an estimate either of the relative number of individual stores charging more than the ceiling price or of the proportion of sales at prices above the legal limits.

For the same purpose, a comparison of prices for canned fruits and vegetables on which community ceilings had been established in Cleveland for July 13, 1943, showed that 55 per cent of the canned fruit and 50 per cent of the canned vegetable quotations received by the Bureau were above community ceiling prices. In the Atlanta region, 22½ per cent of price reports to the Bureau in 16 cities on September 14 were

above ceiling levels, and in the Denver region, 37 per cent of the meats, 24 per cent of the canned fruits, approximately 19 per cent of the eggs, and 14 per cent of the canned vegetables priced on August 17 were above legal ceilings. These findings indicate that the prices reported to the Bureau are not limited to the legal price limits.

TABLE V

PER CENT OF PRICE QUOTATIONS ABOVE CEILING PRICES FOR SPECIFIED ITEMS BY CLASS OF STORE AND DATE*

Class of store† and date	Pork chops	Bacon, sliced	Ham, sliced	Ham, whole	Salt pork	All cuts
Quotations from OPA Class 1 and 2						
April 20, 1943	19	24	33	29	29	26
May 18, 1943	13	18	29	27	24	22
July 13, 1943	42	55	63	54	55	53
August 17, 1943	31	43	54	45	50	43
Quotations from OPA Class 3 and 4						
April 20, 1943	21	17	29	16	23	21
May 18, 1943	19	17	20	18	18	18
July 13, 1943	30	38	26	32	28	33
August 17, 1943	21	32	32	26	20	26
All Quotations						
April 20, 1943	19	22	32	26	27	25
May 18, 1943	14	18	27	24	23	21
July 13, 1943	40	51	57	48	48	49
August 17, 1943	29	41	49	40	42	40

* The percentages in this table are based on the number of quotations above the price ceilings in relation to the total number of quotations for the specified product. They cannot be used to estimate either the number of stores charging prices above ceiling or the volume of purchases made at prices above the legal limits. To obtain such estimates it would be necessary to derive weighted totals of the reports by class of store and by city.

† Class 1 comprises independent stores having less than $50,000 annual sales; Class 2, independent stores with annual sales between $50,000 and $250,000; Class 3, stores having less than $50,000 annual sales and belonging to corporate chains, and Class 4, all stores with annual sales in excess of $250,000.

Use of specifications in obtaining retail prices in the war period. The retail prices which form the basis of the Bureau of Labor Statistics cost of living index represent the cost of goods of the same quality in successive months, insofar as it is possible to price goods of the same quality in wartime markets. As previously explained, the Bureau's field representatives are provided with detailed descriptions of quality and they secure current prices of goods of the defined qualities from store managers and store buyers in personal interviews. When goods of the kind previously priced disappear from the market, new specifications are written to describe the articles currently available and which have the same use. Variations among different stores in qualities sold and the limited information available in regard to the quality of the goods sold

make it necessary to allow a range of quality within each specification. With the aid of these specifications and of their training in evaluating merchandise, the Bureau's representatives normally are able to obtain prices of goods of the same general quality from one pricing period to the next. The task at the present time, however, is especially difficult because wartime shortages necessitate frequent changes in the use of materials and designs by manufacturers, and it is no doubt true that goods of poorer quality are being priced in certain types of merchandise. It would be possible to follow prices of goods of equivalent serviceability more accurately if there were closer quality controls in the production of consumers' goods, and if manufacturers labeled the quality of the goods they produce (by grade, or some other objective measurement). Informative labels which identify the quality of the goods sold are available in relatively few retail stores and for very few commodities in these stores.

The Bureau follows the policy of continually developing new specifications to insure that the list of goods priced for the index is representative of current purchases. In pricing for the June 1943 clothing-cost index, 68 new specifications were used; for example, specifications for 4 grades of rayon stockings, 1 grade of cotton anklets, and 6 qualities of men's suits were added.

Information supplied by manufacturers makes it possible to ascertain changes in materials and construction a season ahead of the appearance of new types of goods in retail stores. Differences in marketing procedures and in climatic conditions in different parts of the country sometimes result in the introduction of new products in the metropolitan areas in the North in one quarter, and in the smaller cities or in the South the following quarter.

In periods of changing incomes, store buyers report that their sales volumes have shifted and thus they recommend pricing in the current period a new item which is within the quality range allowed by the specification but is higher in price than the article priced in the past. When such a change is reported the Bureau's representatives take special care to ask about the new quality in as much detail as possible in order to determine whether the change represents a shift in both quality and price or a change in price only.

When a substitution is made because the quality of the article selling in greatest volume has changed, and the article previously priced is still obtainable, the price of the new article in the current period is compared with its price in the previous period in calculating the index. This process is known as "linking."

The linking process is not used if a commodity which has been a

volume-seller disappears from the market (and from the cooperating outlet in particular) and only higher-priced substitutes are available. The price change shown in this case is calculated in one of two ways. If the higher-priced commodity were a new one the full percentage increase is used in calculating the index. If, on the other hand, the new commodity had been available in the previous pricing period and had been sold in large volume alongside the previously specified commodity, the price change from the old commodity to the new one is determined over two pricing periods by relating the price of the new to the average price of the old and new in the first period. This procedure is followed on the assumption that many members of the group to which the index applies purchased the higher-priced article in the earlier period. Since it is impossible to obtain information on the volume of sales for each quality to the public at large, much less to this particular group, the two prices for the earlier period are given equal weight in the average.

These procedures, which take account of the effect of the disappearance of lower-quality merchandise on the actual cost of living of the wage earner and clerical group, were the most important factors in producing increases in the clothing-cost index in July and August 1943 and were important factors in the increase shown for September 1943.

APPRAISAL OF THE METHODS OF DERIVING AND ADJUSTING THE WEIGHTS

General description. The original cost of living index of the Bureau of Labor Statistics was developed from data on the consumption of wage earners and clerical workers in large cities during the period 1917–19. Cost of living indexes, based on the 1917–19 consumption data were published at regular intervals from February 1921 through 1934. In 1935, the Bureau improved the method of calculating the index and introduced a completely revised system of weights.

A fixed-weight index may remain valid, according to the definition of the index, over a considerable period of time and possibly, with minor revisions, for as long as a decade. Eventually, however, the consumption pattern represented in the index becomes outmoded, and must be completely revised. In the period between 1920 and 1935 many goods and services not commonly sold at the time of the original expenditure study became part of the consumption of wage-earner and clerical groups. Subsequent changes in the price relationships among the various commodities in the family budget altered the relative importance of the goods and services represented in the index and the need for new expenditure data became apparent.

From 1934 through 1936 the Bureau conducted a Nation-wide study of the money disbursements of wage earners and lower-salaried clerical workers. This study, conducted in a period when there was widespread unemployment and large relief rolls, was so planned that it would produce information on expenditures of wage earners and clerical workers living in relatively "normal" circumstances. Consequently, the sample was confined to families with at least one earner, who was employed a specified length of time during the survey year and who had earnings of at least $300 during this period. In addition, no families who had received direct relief or work relief during the year were included. The result of these restrictions was to provide data for cost weights in the index at an expenditure level that would become more representative as the Nation moved towards full employment. Had the Bureau elected to describe the expenditure level prevailing at the time of these surveys, the weights in the index would have deviated markedly from the average plane of living of the groups represented within a few years.

The information from these surveys formed the basis of the revised weights. The net effect of the changes is illustrated by the group weights for all cities shown below.

Item	Relative importance in the index in 1935–39 for:	
	Original index	*Revised index*
Food	31.1	33.9
Clothing	13.8	10.5
Rent	16.0	18.1
Fuel, electricity and ice	6.3	6.4
Housefurnishings	4.7	4.2
Miscellaneous	28.1	26.9
All items	100.0	100.0

The changes in the group weights, in themselves, although relatively large, did not constitute the major alterations in the construction of the index. The changes in the weights for items within groups were more significant, especially in the furnishings and miscellaneous categories. Nevertheless, the comparison of the new and the original index over the period for which both were computed does not reveal large differences in movement.[3]

Changes made in the index in the recent period. The changes in the types of goods and services available to civilians during 1942 and 1943 have necessitated more extensive revisions of the weights than is required in peacetime. These changes are described in an article by

[3] See Charts 2 and 3, Bureau of Labor Statistics, Serial No. R.1156.

Faith M. Williams entitled, "Bureau of Labor Statistics Cost-of-Living Index in Wartime," in the *Monthly Labor Review*, July 1943.

By December 1942 the following goods were dropped from the indexes for all cities: new and used automobiles, refrigerators, washing machines, metal bedsprings, studio couches and innerspring mattresses, sewing machines, vacuum cleaners, gas cook stoves and silk stockings, slips and yard goods. Rayon stockings, cotton hose for women and girls were added to all city indexes and cotton felt mattresses were included in the 22 cities where they were available. The weights for automobile repairs, street car and bus fares and for rayon yard goods and slips were increased while the weights for gasoline and oil and for fuel oil in the area defined by ration order No. 11 were decreased.

Effect of changes in weights on the movement of the index. The effect of the various changes in weights which have been made in the BLS cost of living index since the beginning of the war has been measured by the Committee in two different ways. In the first place, the indexes for

TABLE VI

COST OF LIVING INDEXES PUBLISHED FOR FIVE CITIES FROM DECEMBER 15, 1941, TO FEBRUARY 15, 1943, AS COMPARED WITH INDEXES RECOMPUTED WITH WEIGHTS USED IN CALCULATING COST OF LIVING INDEX FOR FEBRUARY 1943*

(December 15, 1941 = 100)

Date	Birmingham		Chicago		Denver		New York		San Francisco	
	Published index	Recomputed index	Published index	Recomputed index	Published index	Recomputed index	Published index	Recomputed index	Published index	Recomputed index
1941:										
Dec. 15	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1942:										
Jan. 15	101.1	101.0	101.3	101.2	101.7	101.8	101.5	101.4	102.3	102.5
Feb. 15	102.2	102.1	101.6	101.5	102.2	102.2	102.1	102.1	102.6	102.7
Mar. 15	103.0	102.9	102.8	102.7	103.4	103.5	103.0	103.0	104.0	104.0
Apr. 15	103.6	103.8	104.2	104.2	104.8	104.9	103.6	103.6	105.1	105.2
May 15	104.2	104.2	105.3	105.3	105.7	105.8	104.2	104.2	105.7	105.8
June 15	102.8	102.6	105.2	105.1	105.8	105.9	105.1	105.0	105.9	106.1
July 15	102.9	102.7	105.2	105.2	106.0	106.2	106.0	105.9	106.3	106.5
Aug. 15	104.3	104.1	106.1	106.1	106.3	106.6	106.9	106.9	107.5	107.7
Sept. 15	104.3	104.1	106.1	106.1	107.1	107.4	107.0	107.0	108.6	108.9
Oct. 15	105.3	105.1	107.5	107.6	107.7	108.0	108.0	108.0	109.3	109.6
Nov. 15	105.3	105.1	108.0	108.1	108.3	108.6	109.0	109.0	111.1	111.4
Dec. 15	106.1	105.9	108.0	108.1	109.2	109.5	109.8	109.8	111.4	111.7
1943:										
Jan. 15	106.5	106.3	108.3	108.4	109.3	109.6	110.2	110.3	111.9	112.2
Feb. 15	106.6	106.4	109.0	109.1	110.0	110.2	110.6	110.6	111.9	112.3

* This calculation was made by dropping from the monthly aggregates from January 1941 to January 1943 all those goods not used in computing the February 1943 index, and making the appropriate change in the aggregates for goods which were included in the February 1943 index with different weights from those of the base period, for example, reducing the aggregate for gasoline, and increasing the aggregate for street car fares.

five cities were recalculated on the basis of the weights used in calculating the February 1943 index. Since the first weight change was made in January 1942, the index was recomputed back to December 1941. The results of this calculation are shown in Table VI. These indexes were calculated by dropping from each monthly aggregate, beginning with December 1941, the aggregate for the goods not available in February 1943, and by making the appropriate change in each aggregate for which the weight was different in February 1943 than in the base period. The result of this procedure was to produce indexes with constant weights from December 1941 to February 1943. As of the latter date, there was no difference between the recomputed series and the published indexes for New York City. Among the other cities, the greatest difference appeared in the San Francisco index, where it amounted to 0.4 of an index point.

Secondly, the index for all cities combined was recalculated on the assumption that money which could not be spent for goods no longer available would have been spent for goods within the same index group

TABLE VII

THE COST OF LIVING INDEX AS PUBLISHED, AND AS IT WOULD HAVE BEEN IF IT HAD BEEN ASSUMED THAT MONEY WHICH WOULD HAVE BEEN SPENT FOR GOODS NOT NOW AVAILABLE HAD BEEN SPENT FOR AVAILABLE GOODS WITHIN THE SAME INDEX GROUP,* DECEMBER 15, 1941, TO DECEMBER 15, 1942

(1935–39 = 100)

Date	Cost of living index computed without adjustments	Cost of living index as published
1941: December 15	110.5	110.5
1942: January 15	112.0	112.0
February 15	112.8	112.9
March 15	114.2	114.3
April 15	115.1	115.1
May 15	116.0	116.0
June 15	116.3	116.4
July 15	116.9	117.0
August 15	117.4	117.5
September 15	117.7	117.8
October 15	118.9	119.0
November 15	119.6	119.8
December 15	120.2	120.4

* Computed by applying relative changes for each index group, as published, to the corresponding aggregate as of December 15, 1941.

of commodities. For instance, it was assumed that some of the money previously spent on gasoline for automobile travel was spent for other kinds of transportation; that more of the money formerly spent on automobile purchases was spent on repairs, etc. The index which was

obtained by the second calculation is shown in Table VII. This index was computed by applying to the dollar aggregates for each group of goods and services relative changes in costs for that group as published. The recomputed index (shown in Table VII) was lower than the published cost of living index for December 15, 1942, by two-tenths of a point; this lower level was due to the increased weight resulting from the computation which fell upon the more stable items in the index. Table VIII shows the effect of the recomputation on the relative importance of the various groups of items.

TABLE VIII

CHANGES IN RELATIVE IMPORTANCE OF DIFFERENT GROUPS OF ITEMS, DECEMBER 15, 1942, EFFECTED BY RECOMPUTATION

Items	In the BLS index as published		If it had been assumed that money which would have been spent for goods not available had been spent for available goods within the same index group
	December 15, 1941	December 15, 1942	December 15, 1942
All items	100.0	100.0	100.0
Food	36.2	41.0	39.0
Clothing	11.4	12.1	11.5
Rent	18.4	17.8	16.9
Fuel, electricity and ice	6.4	6.2	6.0
Housefurnishings	4.6	3.2	4.5
Miscellaneous goods and services	23.0	19.7	22.1

Effect of complete weight revision. If a revision similar to that introduced in 1935 were envisaged now, a similar expenditure study would need to be undertaken. The wage-earner and clerical groups have experienced an appreciable rise in average income since 1940. At the same time, prices have been rising and to a certain extent adjustments to price changes have been made possible by the increase in income. The weights in the index are based on the money expenditures of families that had in 1934–36 an average income of $1,524. The index represents the cost, at present prices, of the goods purchased in 1934–36 at the level of $1,524 income. At the present time, the average income of similarly defined population groups is probably well above $2,000. Their money expenditures are determined by the income, the price level and the availability of goods. To illustrate the degree of difference between the allocation of expenditure costs in the index and the expenditure pattern prevailing at a time other than the base period, data from the Bureau of Labor Statistics "Survey of Spending and Saving

in Wartime" for the first quarter of 1942 for wage earners and lower-salaried clerical workers in large cities are compared with the expenditure weights in the index for February 1942, in the accompanying tabulation.

Item	Cost* weights in cost of living index, February 1942†	Expenditures* by wage earners and clerical workers in large cities, 1st quarter, 1942	
		All income levels	*Income level $1,500*
Food	35.1	32.8	34.3
Housing and fuel	23.3	18.4	21.4
Housefurnishings	4.5	4.8	3.3
Clothing	11.1	11.8	10.6
Miscellaneous	26.0	32.2	30.4
All items	100.0	100.0	100.0

* Percentage of total costs.
† Income level in 1934–36 was $1,524.

An index based on average current expenditures for current income levels would put less emphasis on housing, slightly less on food, and more weight on the miscellaneous groups. If, beginning in February 1942, the group indexes had been weighted by the distribution of the average actual expenditures of all wage earners and clerical workers in large cities in the first quarter of 1942 (column 2 above) the change in the index from February 1942 to October 1943 would have been 10.2 per cent. This was exactly the change shown by the index computed according to the 1934–36 weights adjusted for shortages.

APPRAISAL OF THE CITY SAMPLE

In 1940 there were 199 cities having a population of 50,000 or more in the continental United States. The national (average) cost of living index of the Bureau of Labor Statistics is based on a sample of 34 of these cities as shown below.

1940 population	United States		BLS sample
	Number of cities	*Total population (thousands)*	*Number of cities*
500,000 or more	14	22,368	14
100,000–500,000	78	15,620	16
50,000–100,000	107	7,344	4
Total	199	45,332	34

The cities in the sample comprise 61 per cent of the total population

in large cities. Two of the cities, New York and Chicago, have nearly one-fourth of the urban population in cities of 50,000 or more.

The indexes for each city are combined to form the national average by weighting each city index so that it represents the population in the cities in the surrounding area. The weight for the city of Detroit, for example, is based upon its own population plus that of Jackson, Kalamazoo, Toledo, Grand Rapids, Flint, Lansing, and Saginaw. The population weights of the cities in the index which were revised in March 1943 on the basis of the data from the 1940 Census,[4] and the population estimate derived from the distribution of the sugar-ration books are shown below.

Region and city	Population weight	Region and city	Population weight
North Atlantic:		South Central, continued:	
Boston	8.8	Mobile	.3
Portland, Maine	.2	Houston	3.9
Manchester	.1	New Orleans	1.1
Buffalo	3.9	North Central:	
New York City	13.4	Chicago	8.1
Philadelphia	7.2	Milwaukee	1.7
Pittsburgh	4.2	Indianapolis	2.2
Scranton	.9	Cincinnati	4.1
South Atlantic:		Detroit	6.1
Baltimore	1.8	Cleveland	3.6
Washington	1.9	St. Louis	2.5
Richmond	1.0	Kansas City	2.8
Norfolk	.7	Minneapolis	1.7
Atlanta	1.3	Western:	
Savannah	.6	Denver	1.2
Jacksonville	1.1	Seattle	1.3
South Central:		Portland, Oregon	.7
Birmingham	2.0	San Francisco	3.1
Memphis	.9	Los Angeles	5.6

The combination of the city data in the national average may be expressed by the formula: $(\sum n_i e_i R_i)/(\sum n_i e_i)$ where n_i is the population weight and e_i is the cost weight in the base period, and R_i is the index for the ith city. The influence of each city in the national average depends both on the population weight and the expenditure level of wage earners and clerical workers in that city in the base period. The cost of the goods purchased by clerical workers in 1934–36 in each of the 34 cities is shown below, at average 1935–39 prices.

The families of wage earners and clerical workers in both New York and Chicago had relatively high expenditures in 1934–36 as compared

[4] For a complete list see *Monthly Labor Review*, July 1943: "The Bureau of Labor Statistics Cost of Living Index in Wartime."

with similar families in other large cities, and consequently the expenditure weight of these cities in the national index is even greater than if the weight represented population alone.

Atlanta	$1315.02	Milwaukee	$1591.71
Baltimore	1350.06	Minneapolis	1593.99
Birmingham	1287.01	Mobile	1191.80
Boston	1593.58	New Orleans	1215.69
Buffalo	1533.28	New York	1846.31
Chicago	1659.25	Norfolk	1355.48
Cincinnati	1480.34	Philadelphia	1590.33
Cleveland	1639.68	Pittsburgh	1527.32
Denver	1524.34	Portland, Me.	1476.96
Detroit	1692.73	Portland, Ore.	1499.58
Houston	1447.05	Richmond	1428.88
Indianapolis	1452.91	St. Louis	1507.31
Jacksonville	1339.14	San Francisco	1690.05
Kansas City	1400.54	Savannah	1182.22
Los Angeles	1587.77	Scranton	1422.70
Manchester	1454.46	Seattle	1588.04
Memphis	1238.84	Washington, D.C.	1958.81

Tests show that the number of cities in the sample is large enough to provide a stable national average. In March 1943, when the all-city index was 126, the standard deviation of the city indexes from their

TABLE IX

COST OF LIVING INDEXES OF TWO SUBSAMPLES OF THE 34 LARGE CITIES AND THE BLS COST OF LIVING INDEX, FOR SPECIFIED DATES*

(1935–39 = 100)

Item	March, 1939			March, 1942			March, 1943		
	Subsample 1	Subsample 2	Published BLS	Subsample 1	Subsample 2	Published BLS	Subsample 1	Subsample 2	Published BLS
All items	99.7	99.3	99.1	114.3	113.9	114.3	121.5	121.8	122.8
Food	94.9	94.2	94.6	119.8	118.0	118.6	138.8	136.9	137.4
Clothing	100.5	100.4	100.4	124.6	123.3	123.6	128.4	127.6	127.6
Rent	104.4	104.4	104.3	109.7	108.8	108.9	108.0	108.0	108.0
Fuel	101.0	99.4	100.1	103.9	104.0	104.5	106.2	106.8	107.4
Housefurnishings	101.0	100.9	100.9	121.3	120.6	121.2	123.8	121.6	124.5
Miscellaneous	100.5	101.2	100.5	108.6	109.7	110.1	113.0	114.6	114.5

* Each subsample included 18 cities, New York and Chicago, and 16 of the other large cities, selected as representative with respect to region and city size.

average was 0.37 points, that is, the variation in the monthly change in the individual cities amounted to about three-tenths of a per cent. In order to corroborate the usual tests of significance of the average,

the 34 cities in the sample were divided into two subsamples of 18 cities each selected on a stratified random scheme.[5] The indexes calculated for these two subsamples are shown in Table IX. The two subsamples were in substantial agreement, although the first tended to give consistently higher values than the second, a finding which may appear in samples when all of the measures are positively correlated.

The Bureau of Labor Statistics also collects data and constructs indexes for a sample of 20 small cities (see Table I) representing cities with population of 5,000 and less than 50,000. These 20 cities have a total population of 374,996 which represents 1.6 per cent of the total population of the 1,843 cities which in 1940 had populations within this range. The number of small cities in the index sample compared with the number in each population group of cities is shown below.

1940 population	United States		BLS Sample
	Number of cities	*Total population (thousands)*	*Number of cities*
25,000–50,000	213	7,417	6
10,000–25,000	665	9,967	9
5,000–10,000	965	6,682	5
Total	1,843	24,066	20

The number of cities for which the Bureau conducts cost of living studies is not large enough to provide regional or state averages. Even though two out of three large cities in a state may be represented in the index, they may not give a sound basis for driving an estimate of all the cities in the state. The city is so large a sampling unit that even a large "sample" of the cities in a geographic area may yield averages that are biased estimates of averages for the total group of cities.

The national average cost of living has uses in connection with many problems of economic analysis and administrative policy. It is possible that regional or state averages would have similar usefulness in connection with regional or state problems, but indexes for geographic groups would prove more useful if the coverage extended beyond the large cities.

COMPARISON OF THE BUREAU OF LABOR STATISTICS INDEX WITH OTHER INDEXES

State indexes. Several state agencies prepare cost of living indexes for cities in their states. The Bureau of Labor Statistics assisted the Penn-

[5] Because of the importance of New York City and Chicago, they would be included normally in any stratified sample. They were, therefore, included with 16 other cities in each of the subsamples.

sylvania Department of Labor and Industry, the Michigan Department of Labor and Industry, and the Bureau of Business Research of the Louisiana State University in inaugurating their indexes, by preparing weights for their use and by transmitting copies of the Bureau's schedules and specifications, for adaptation to their situations. At their request the Bureau trained their field agents in its price-collection methods and their office staffs in its method of office computation. The Bureau does not, however, correspond with these agencies currently on the matter of editorial decisions arising in the processing of the data. The procedures used by the Massachusetts Division of the Necessaries of Life and the New Jersey Department of Agriculture are completely independent of those of the Bureau. In general the price changes as shown by the state indexes for commodity groups and for all living costs are of the same order of magnitude as the changes measured by the Bureau in cities or groups of cities in the same region. The few large differences can be explained on the basis of differences in methods of price collection. In Pennsylvania, Michigan and Louisiana, the state indexes are prepared for communities not included in the Bureau's sample, and the state agencies in Massachusetts and New Jersey do not publish separate figures for the cities in these states covered by the Bureau. Hence, strict comparisons of the Bureau's series with state series are not possible.

National Industrial Conference Board cost of living indexes. The National Industrial Conference Board currently computes two series of cost of living indexes—one based on a "pre-war fixed weight budget," the other on a "wartime budget" based upon the pre-war budget adjusted by methods similar to those adopted by the Bureau of Labor Statistics.

The indexes for the pre-war budget are computed separately for 70 cities and for the United States. The national index is based on data from many cities in addition to those for which separate indexes are prepared. This series extends back to 1914 and is based upon a list of goods and services similar to that used in the Bureau of Labor Statistics index prior to 1942.

In May 1943, the Board began publication of revised indexes for individual cities and by October had completed revision of indexes for 58 cities. These revisions take account of data received too late for inclusion in the current monthly figures and utilize newly available family-expenditure data. The revisions include changes in budgetary weights. Publication of a series of indexes based on a "wartime budget" began in the late spring of 1943.

A comparison of the percentage change from March 1942 to Sep-

tember 1943 in the indexes series for the 27 cities covered by both agencies shows that in 19 of the 27 cities, the BLS index advanced more rapidly than the NICB war-time index, and in 16 cities, it advanced more rapidly than the NICB pre-war index. The greater change in the BLS indexes was caused chiefly by larger increases shown in the cost

	Number of cities for which same percentage change was shown by BLS and NICB	Number of cities for which greater percentage change was shown by BLS	and NICB
Comparison with NICB wartime series:			
All items	0	19	8
Food	0	13	14
Clothing	0	21	6
Rent	2	15	10
Fuel, electricity and ice	1	14	12
Housefurnishings	0	19	8
Miscellaneous	0	25	2
Comparison with NICB pre-war series:			
All items	0	16	11
Food	1	14	12
Clothing	0	22	5
Rent	2	15	10
Fuel, electricity and ice	1	12	14
Housefurnishings	1	18	8
Miscellaneous	0	19	8

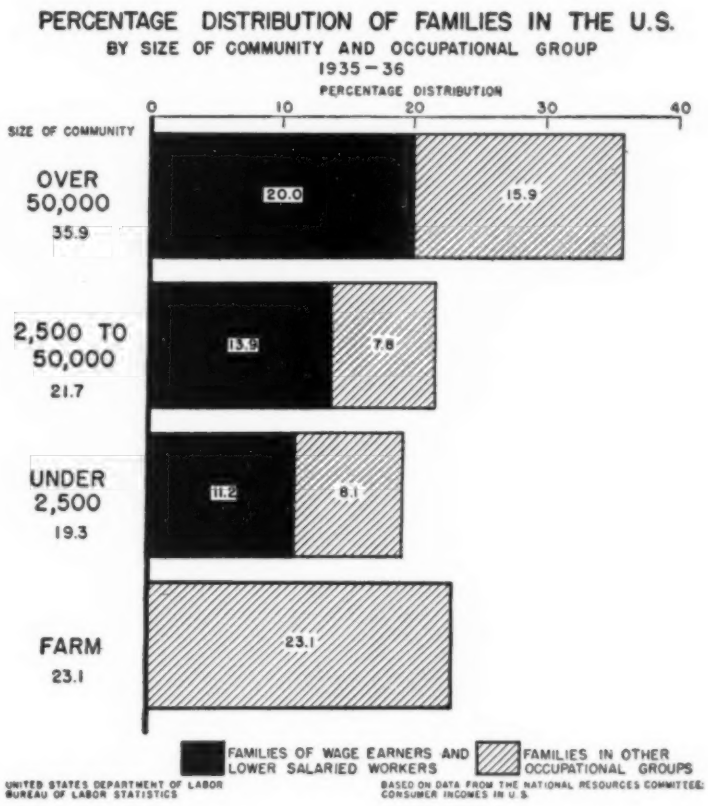
of clothing, housefurnishings, and miscellaneous items. The following tabulation shows the number of cities for which the change in the BLS index was higher than the change in the indexes based on NICB wartime budget and NICB pre-war budget, between March 15, 1942, and September 15, 1943. In the same period the relative change in the cost of living in all large cities amounted to an increase of 8.4 per cent in the Bureau of Labor Statistics series and to an increase of 7.1 per cent in the pre-war and of 7.2 per cent in the wartime series of the National Industrial Conference Board.

THE INDEX AS REPRESENTATIVE OF BROADER POPULATION GROUPINGS

The groups represented by the index of the Bureau of Labor Statistics, wage earners and clerical workers in large cities, comprised about 20 per cent of the total population as indicated in Chart I in the years 1935–36. The other official index based on retail prices—that of the

Bureau of Agricultural Economics—covering the *commodities* farmers buy represented another fifth of the population. Thus, about three-fifths of the population is not represented directly by any published index. The Bureau of Labor Statistics collects data on the cost of living of wage earners and clerical workers in 20 small cities which could be

CHART I

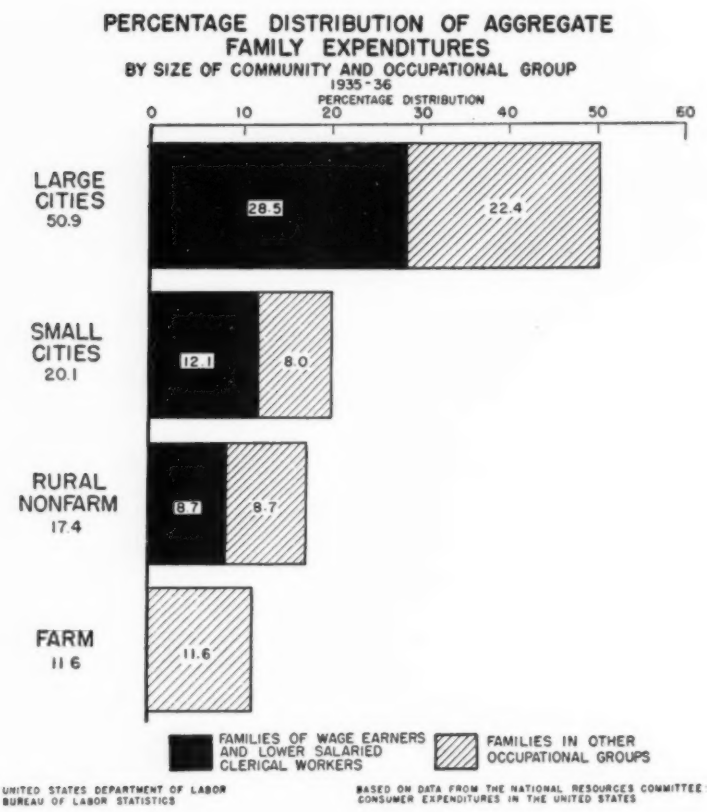


used as a preliminary basis for an index for wage earners and clerical workers in cities of 2,500 to 50,000 population. This group adds about 14 per cent of the population to the index "coverage," leaving over two-fifths of the population for which little or nothing is known about the changes in living costs.

The population groups just described are of unequal importance in

the hypothetical national index, in terms of the dollar value of their expenditures. The groups covered by the index for large cities and by the potential index for small cities have a greater weight in terms of dollar expenditures than in terms of population (Chart II). The one-third of the families of the country in the wage-earner and clerical

CHART II



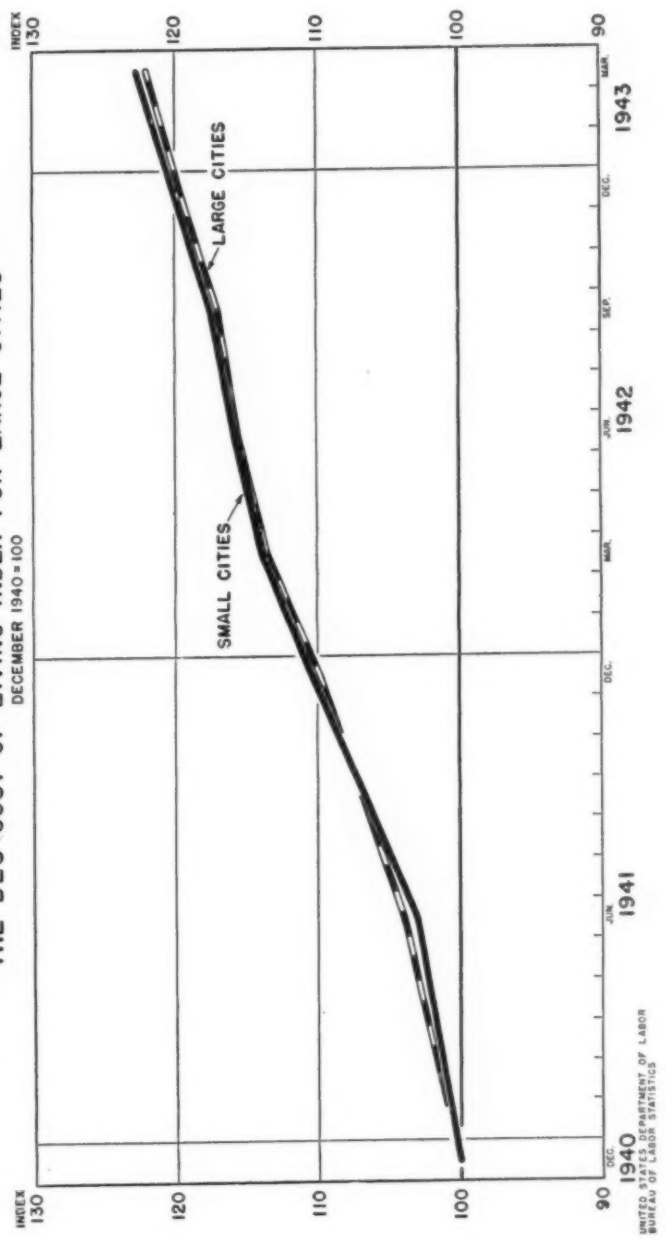
groups who lived in cities, large and small, spent 41 per cent of the total United States outlay for consumer goods and services in 1935–36. The farm population accounted for another 12 per cent of these aggregate expenditures, leaving 47 per cent of the total national expenditures not covered by a cost of living index.

The cost of living has increased somewhat more in small cities than

CHART III

AN ESTIMATED COST OF LIVING INDEX FOR SMALL CITIES COMPARED WITH THE BLS COST OF LIVING INDEX FOR LARGE CITIES

DECEMBER 1940 = 100



in large cities (Chart III). Hence a national index for wage earners and clerical workers in urban communities in the period for which data are available would be above the level of the large-city index. The general order of magnitude of such an index is illustrated in the estimates given below for the period December 1940 through March 1943.

Index for Wage Earners and Clerical Workers
(December 1940 = 100)

	In large cities	*In small cities (estimated)*	*In all cities (estimated)*
1940: December	100.0	100.0	100.0
1941: June	103.9	103.1	103.6
December	109.8	110.3	110.0
1942: March	113.5	113.8	113.6
June	115.6	115.8	115.7
September	117.0	117.5	117.1
December	119.6	120.1	119.7
1943: March	121.9	122.7	122.2

The index for wage earners and clerical workers in large cities (December 1940 = 100) was only 0.3 below the index for that group in all cities in March 1943.

The groups whose expenditures formed the base period weights for the cost of living index in large cities had an average money income of $1,524 in 1934–36. All urban families in 1935–36 had an average income of $1,785. The differences in expenditure patterns for these two levels of average income are slight, as is indicated by the following group percentages.

	Per cent of total expenditures	
	*Wage-earner and clerical families in 1934–36**	*All urban families in 1935–36†*
Food	33.5	31.3
Housing	17.1	15.5
Household operation (incl. fuel)	10.9	12.2
Furnishings	4.0	3.5
Clothing	10.6	10.3
Automobile	5.8	7.8
Medical care	3.9	4.6
Personal care	2.0	2.2
Recreation	5.5	6.3
Education	0.5	1.0
Gifts	2.9	3.4
Other	0.8	0.4

* U. S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 638: *Money Disbursements of Wage Earners and Clerical Workers, 1934–36.*

† National Resources Committee, *Family Expenditures in the United States, 1935–36.*

These differences in group weights would alter the index very little if the constituent items priced for the index remained the same. The items chosen for an index applicable to the total urban population would doubtless differ in some respects from those that were selected for the index of wage earners in large cities. However, since the consumption of the numerically large middle group is represented in the index, the differences in the choice of items would result in a measure that probably would not deviate substantially from the published index.

An estimated index for all nonfarm families (urban and rural nonfarm families) may be compared with the Bureau of Labor Statistics index for large cities in the table below. This index was prepared for the Committee on the basis of the present figures for small and large cities and the different expenditure levels of groups living in large cities, small cities, and in rural nonfarm territory on the assumption that price changes in all small communities were the same as in the small cities. It appears that in the period for which such estimates can be made, the Bureau of Labor Statistics index was only slightly lower than an index representing *all* nonfarm families.

	BLS large-city index	Index for all nonfarm families (estimated)
	(*December 1940 = 100*)	
1940: December	100.0	100.0
1941: June	103.9	103.5
December	109.8	110.0
1942: March	113.5	113.6
June	115.6	115.6
September	117.0	117.2
December	119.6	119.9

INDEXES FOR DIFFERENT REGIONAL OR INDUSTRIAL GROUPS

The national index is often the most suitable in a given situation, but frequently it is used simply because no index exists for the geographic unit under consideration. The Bureau's indexes for individual cities coupled with the information assembled by several of the states give evidence of the degree of geographic variation in the changes in the cost of living of wage earners and lower-salaried clerical workers. Little or no information has been accumulated for estimating the variability of changes in the cost of living among the component groups in this broad classification or among the segments of the population not represented.

The percentage changes in the cost of living in 34 cities from August 1939 to September 1943 ranged from an increase of 21.4 per cent in

Minneapolis to an increase of 34.0 per cent in Norfolk. In approximately half of the cities the rise in the cost of living was in excess of the average. Most of the cities in which the rise in the cost of living was above the national average are in the South and the West. Since the small cities in these regions likewise have experienced a relatively great increase in the cost of goods and services purchased by wage-earner and clerical families, it is apparent that a national index cannot be taken as representative of the trend in the separate regions.

In order to develop indexes representative of particular groups, the price collection and the expenditure studies of the Bureau would have to be greatly expanded. The sample of 34 large cities plus the 20 small cities and other cities now included in cost of living studies by the Bureau is far too small to provide an adequate basis for regional or state indexes.

An index for a region would require a city sample composed of approximately as many cities as are now included in the national sample since the variation in the changes in prices in cities within a region is nearly as great as the variation in the price changes in all cities of the country. If indexes were prepared for 5 regions, the total city sample should include no less than 100 communities.

Indexes for industrial groups such as textile workers or coal miners would also require samples of stores in about as many communities as are now in the national sample. The present 34-city index includes only 2 cities in the coal-mining areas and 5 that may be called textile centers. An index for either group would require a larger representation of small towns than would be necessary for regional indexes, as workers in both these industries are largely concentrated in small cities and towns.

INDEXES FOR DIFFERENT INCOME GROUPS

The index represents expenditures of what may be characterized as a moderate-income group. In periods of rapidly rising prices there are segments of the population with low (and fixed) incomes for whom the increase in the cost of living is a real hardship. During 1942 and 1943 prices of lower-quality goods and low-rent housing have experienced relatively the most extreme upward rise. An index for low-income groups would accordingly show a greater rise than the published index because the lower-quality goods have a heavier weight in their expenditure pattern. To measure the difference an index has been calculated for two dates for a low-income group defined as the urban families with incomes below the median in 1935–36 (Table X). The average expenditures of this group were divided among the categories as follows:

Total expenditures	$830
Food	326
Clothing	65
Rent	182
Fuel, electricity, ice	78
Furnishings	24
Miscellaneous	155

In Table XI, dollar expenditures and the percentage distribution of costs for subgroups in this index are shown in comparison with the weights for the Bureau of Labor Statistics index.

TABLE X

INDEXES OF COST OF LIVING OF WAGE EARNERS AND CLERICAL WORKERS AND OF LOW-INCOME GROUP IN URBAN POPULATION, DECEMBER 1942 AND MARCH 1943*

(August 1939 = 100)

Item	December 1942		March 1943	
	BLS index	Low-income group	BLS index	Low-income group
All items	122.1	124.5	124.5	127.8
Food	141.9	143.4	147.0	150.0
Clothing	125.5	130.2	127.2	132.3
Rent	103.5	106.6	103.5	106.6
Fuel, electricity and ice	109.0	108.1	110.2	109.7
Housefurnishings	123.0	124.8	123.8	125.8
Miscellaneous	112.4	110.1	114.0	111.9

* The low-income group was defined as the half of the urban population with incomes below the median in 1935–36.

By December 1942 the cost of goods and services purchased by the low-income group had risen 24.5 per cent as compared with August 1939. By March 1943 the advance had reached 27.8 per cent. These percentage changes are based on the prices collected by the Bureau of Labor Statistics for the lowest-quality goods included in the regular index. The increases shown by the Bureau of Labor Statistics cost of living index for the corresponding dates were 22.1 and 24.5. The substantial differences in the weights thus resulted in less than 4 points difference in the index since many of the changes were offsetting.

This comparison was limited to families of two or more persons maintaining households. A relatively large number of the economic units in the lower income brackets are single men and women, living in rooming or boarding houses. The changes in the cost of living for this group can not be estimated because data on room rentals, room and board, and restaurant meals have never been collected on a compre-

TABLE XI

EXPENDITURES OF LOW-INCOME URBAN FAMILIES IN 1935–36, AND OF EMPLOYED WAGE-EARNER AND CLERICAL FAMILIES, 1934–36

Expenditure group	Expenditures of low-income urban families*			Expenditures of employed wage-earner and clerical families†		
	Amount	Distribution of		Amount	Distribution of	
		Total expenditures	Group expenditures		Total expenditures	Group expenditures
	Dollars	Per cent	Per cent	Dollars	Per cent	Per cent
Food	*$326.00*	*39.3*	*100.0*	*$508.00*	*33.6*	*100.0*
Cereals and bakery products	53.15		16.3	79.25		15.6
Meat, fish, poultry	86.72		26.6	143.26		28.2
Dairy products	59.98		18.4	97.03		19.1
Eggs	19.23		5.9	27.94		5.5
Fruits and vegetables	67.48		20.7	109.72		21.6
Beverages	11.41		3.5	17.27		3.4
Fats and oils	15.32		4.7	16.26		3.2
Sugar and sweets	12.71		3.9	17.27		3.4
Clothing	*65.00*	*7.8*	*100.0*	*160.00*	*10.6*	*100.0*
Shoes	14.25		21.9	28.16		17.6
Overcoats, coats	8.80		13.6	21.44		13.4
Men's suits, trousers, jackets, overalls	10.84		16.6	28.32		17.7
Men's shirts, underwear, socks	7.93		12.2	20.32		12.7
Women's dresses, skirts	8.81		13.6	21.60		13.5
Women's underwear, hose	7.23		11.1	19.68		12.3
Hats, gloves, etc.	3.95		6.1	8.64		5.4
Dry cleaning, shoe repairs, etc.	3.19		4.9	11.84		7.4
Housefurnishings	*24.00*	*2.9*	*100.0*	*60.00*	*4.0*	*100.0*
Furniture	6.23		26.0	17.04		28.4
Household appliances	9.90		41.2	23.82		39.7
Textile furnishings	4.85		20.2	13.38		22.3
Other furnishings	3.02		12.6	5.76		9.6
Fuel, electricity, ice	*78.00*	*9.4*	*100.0*	*108.00*	*7.1*	*100.0*
Fuel	50.35		64.6	68.58		63.5
Electricity	20.08		25.7	27.00		25.0
Ice	7.57		9.7	12.42		11.5
Miscellaneous	*155.00*	*18.7*	*100.0*	*417.00*	*27.6*	*100.0*
Transportation	34.81		22.5	125.00		30.0
Medical care	31.98		20.6	59.00		14.1
Household operation	20.35		13.1	58.00		13.9
Recreation	31.00		20.0	82.00		19.7
Personal care	15.52		10.0	30.00		7.2
Gifts, contributions and unallocated items	21.34		13. 8	63.00		15.1
Housing	*182.00*	*21.9*	*100.0*	*259.00*	*17.1*	*100.0*
All items	*$830.00*	*100.0*	*xxx*	*$1512.00*	*100.0*	*xxx*

* Urban families with incomes below the median in 1935–36. Data from National Resources Planning Board report, Family Expenditures in the United States.

† Data from U. S. Department of Labor, Bureau of Labor Statistics Bulletins No. 638 and No. 699.

hensive scale. The extension of index coverage to this group would be desirable not only because it is becoming numerically more important but also because, in times like the present, many persons live apart from their families with similar living arrangements.

PLACE-TO-PLACE COMPARISON OF THE COST OF LIVING

The question, "How much more does it cost to live in City A than in City B?" is one which arises repeatedly in wage negotiations in the setting of salary scales, and in considering the locations of new plants. Measurement of intercity differences in living costs during the same period requires comparing prices for identical items or for items which, making allowance for climate or custom, provide the same standard of living in each city. In particular the selection of articles must not be biased by differences in income levels prevailing in the separate communities.

The needs for such measures of geographic differences have multiplied in recent years. The construction of the necessary family budget involves a considerable amount of research to determine the differences in climatic requirements, local tastes and preferences that are independent of income differences. Once such a set of budgets is defined (or a methodology for their construction developed) the pricing would follow the same general lines as in the present index.

Lacking sufficient funds for original studies in this field, the Bureau of Labor Statistics has for some years calculated the approximate cost in a number of cities of a budget developed in the mid-thirties by the Works Progress Administration. Since the budget was constructed before the data were made available from the two large surveys of family expenditures made in the years 1934 through 1936, a revision in many details would be desirable.

If the pricing of a budget were extended to more and smaller communities, the Bureau could develop measures of the changes in the cost of living that arise from the combination of price change and a migration resulting in a significantly different distribution of families among the communities.

NOTES AND DISCUSSIONS

GEORGE H. VAN BUREN, 1874–1943

GEORGE H. VAN BUREN, who retired from his active duties in the Metropolitan Life Insurance Company on January 1, 1941, after 24 years of service, died suddenly on August 2, 1943, at the age of 69.

Mr. Van Buren was internationally known among vital statisticians and was a recognized authority on the classification of causes of death. He began his career in this field in the United States Bureau of the Census in 1900, where he was Expert Chief in the Vital Statistics Division from 1914 to 1916, and was largely responsible for the editing of the Census Bureau's annual reports on mortality in the United States and of various Census monographs and pamphlets on vital statistics. He was in complete charge for 10 years of the work relating to the classification of causes of death.

In 1920, he was the joint representative of the American Statistical Association and the American Public Health Association to the Paris International Conference on the Classification of Causes of Death. In 1929, he was appointed by the Government as delegate to the second of these conferences. Incidentally, it was he who prepared the translation of the first International List of Causes of Death from French into English.

He served for 21 years as Executive Secretary to the American Public Health Association's Committee on the Accuracy of Certified Causes of Death, and represented the American Statistical Association on the National Conference on Nomenclature of Diseases, being also a member of the Executive Committee of this National Conference. To the Statistical Bureau of the Metropolitan Life Insurance Company he gave, for almost a quarter of a century, the full measure of his experience gathered in these fields.

His warm personality had won him a host of friends wherever he was engaged. Those who profited by his guidance will long remember his generous and encouraging spirit.

ALFRED J. LOTKA

THE NEW WHEAT CONDITION FIGURES, BASED ON WEATHER FACTORS, FOR THE PRAIRIE PROVINCES REJOINDER

By F. H. Sanderson
Harvard University

In the December 1942 issue of this Journal, the writer undertook an analysis of the recent shift by the Bureau of Statistics of the Dominion of Canada from wheat condition figures based on crop correspondents' returns to "condition figures" based on a statistical study of weather-yield relationships.[1] The writer compared the two series and reached the conclusion that the new series may be expected to be less reliable than the old, instead of being at a 7:3 advantage as the Bureau had maintained. It was also pointed out that a combination of reported condition and weather data gave results superior to the use of either series alone.

Limitations of space preclude a full analysis of Dr. Wilson's reply. His central thesis, that the regression method of interpreting condition figures is not applicable to short-season crops like spring wheat, is certainly untenable. Dr. Wilson admits that this method has yielded satisfactory results in forecasting long-season crops like winter wheat in the United States. But our spring wheat crop, the greater part of which is grown in the Dakotas and Montana under conditions similar to those prevailing in the Prairie Provinces, has been predicted from reported condition with even greater success, as measured by the correlation coefficient, than winter wheat.

It seems, however, that on this particular point Dr. Wilson is not prepared to accept empirical evidence—excepting, perhaps, the July 31 report. Regardless of the "statistical"[2] significance of the results, he thinks that it is "logically futile" to try to predict the yield of spring wheat prior to July 31, because the "major determinants of yield are not on record" before this date.

This statement is not borne out by the facts. An analysis made by this writer shows that in the Dakotas and Montana, the preseasonal and spring precipitation up to May 31 accounts for more than 50 per cent of the variations in spring wheat yields. It is, therefore, not surprising that the reported condition as of May 31 does often supply a fairly reliable basis for forecasting yield. Weather conditions during June are important, however. A careful study, by means of a "regression integral," of spring wheat yields at Dickinson, N. D., indicates that

[1] This Journal, Vol. 37, No. 220, December 1942, pp. 473–483.
[2] Dr. Wilson's quote marks.

the crop reaches its maximum susceptibility with respect to rainfall about June 20. By June 30, the major determinants of yield are on record.[3]

In view of the relationships known to exist between weather conditions early in the season and spring wheat yields, and considering the rather high correlations found, it is difficult to see the "logic" in Dr. Wilson's refusal to "attach significance" to the earlier reports. But it is on these "logical" grounds that Dr. Wilson rejects any evidence based on the May 31 and June 30 reports and that he believes himself justified in confining his discussion to a comparison of the results for July 31. This is the more puzzling as he evidently did attach significance to the earlier reports when his office shifted from the old to the new method. In explaining the reasons for the change, the 7:3 ratio was derived on the basis of a comparison of the May 31, June 30 and July 31 reports. It may be added that to the users of crop reports, the earlier reports are just as important as the July 31 estimate.

If the method suggested by this writer as a means of improving the old-style condition figures has any merit, it lies in the fact that it increases the reliability of the earlier forecasts. However, this approach is set aside by Dr. Wilson largely on the same grounds as the regression methods in use in the United States Department of Agriculture. In addition, he questions the choice of weather factors used for the adjustment of condition figures. He concedes that it is logical to assume that soil moisture reserves are generally neglected by crop correspondents in their earlier reports, but holds that this additional variable is "subject to question" in the later reports, since correspondents "would have visual evidence of any significant differences" soil moisture reserves have made. The results of the writer's condition-and-weather analysis are in complete agreement with Dr. Wilson's reasoning. The relative importance of the factor "preseasonal precipitation" as a determinant of yield diminishes rapidly as the season advances.

Davis' and Pallesen's regression integral shows that the crop reaches its maximum sensitivity to rainfall about June 20, when an additional inch of rain would lead, on the average, to an increase in yield of four bushels per acre. After heading (which occurs about July 10), the beneficial effect of rain decreases sharply and reaches zero about July 20. Consequently, it is not at all illogical to find that the inclusion of weather conditions during the ten days preceding the June 30 report leads to a significant improvement in the correlation between reported condition and yield, whereas no such improvement results in the case of the July 31 report.

[3] See F. E. Davis and J. E. Pallesen, "Effect of the Amount and Distribution of Rainfall and Evaporation during the Growing Season on Yields of Corn and Spring Wheat," *Journal of Agricultural Research*, Vol. 60, No. 1, January 1, 1940, pp. 1–23.

With regard to the July 31 report, Dr. Wilson is now willing to accept the regression method of interpreting reported condition. In an attempt to prove that even on this basis the new series is superior to the old, he excludes from consideration two years in which, he holds, "extraneous factors" were dominant. It so happens that his two largest errors of estimation fall in these two years. In one of these years, "extensive rust damage" was reported, but the same is true of other years which were not omitted. The exclusion of the other year could not even be supported by a qualitative indication of "extraneous" damage. This observation was omitted "because of the extremely abnormal distribution of rainfall in June and July": after a long period of drought, heavy rain fell in the last few days of July, too late to repair the earlier damage. Dr. Wilson does not say how his formula will enable him to make allowance for such "abnormalities" when they occur again in the future. It is precisely one of the principal weaknesses of the conventional weather-crop analyses that they are not sensitive to variations in the distribution of rainfall, etc., *within* the broad periods which serve as time intervals. The two-months period (June-July) used by Dr. Wilson contains a period of maximum sensitivity of the plant with respect to rainfall (about June 20), as well as a period in which the effect of rainfall is zero (the end of July).

A FURTHER REPLY

BY C. F. WILSON
Dominion Bureau of Statistics

Two points of fact and a question of procedure arising from Mr. Sanderson's Rejoinder prompt this further reply.

The first point of fact is raised in Mr. Sanderson's statement that the spring wheat crop of the Dakotas and Montana is grown "under conditions similar to those prevailing in the Prairie Provinces." This comparison is inadequate to the point of being incorrect. Within the Prairie Provinces themselves there is at least a five-week range in the dates of harvest; on the average the harvest is three weeks behind that of the Dakotas and Montana. Accordingly, the Davis-Pallesen regression integral indicating the maximum susceptibility of the crop to rainfall around June 20 at Dickinson, N. D., would suggest a corresponding period of maximum susceptibility in the Prairie Provinces around the end of the first week in July. This is quite in keeping with my thesis that the major determinants of yield in the Prairie Provinces are not on record in time for dependable forecasts of final yield to be made as of May 31 and June 30. Analyses at these dates are logically consistent only so far as they appraise the crop progress to date. The importance of July temperatures, in addition to rainfall, emphasizes this conclusion.

The second point of fact arises from Mr. Sanderson's concluding remark that the June-July period in my analysis "contains a period of maximum sensitivity . . . (about June 20) as well as a period in which the effect of rainfall is zero (the end of July)." As already indicated, the June 20 Dickinson, N. D., date would fall around July 5–10 for the Prairie Provinces, where the plant which is headed and filling toward the end of July is very considerably benefited by rainfall during that period. The only condition under which the effect of end-of-July rainfall is zero would be that in which the plant had already collapsed from drought.

This leads to the question of procedure raised by Mr. Sanderson's criticism of my exclusion of the 1937 data from the Alberta analysis, because collapse from drought had occurred. The answer to Mr. Sanderson is that when this happens in the future, rainfall following collapse would properly be excluded from the data. Had this been done in the analysis, and the 1937 observation included, the resulting test of significance might have been improved. In any event, the effect of the exclusion (rather than adjusting the data) of that observation on the appraisal of the analysis is small in comparison with the effect of Mr. Sanderson's exclusion from his analysis of the whole record for Manitoba, and the years 1938, 1939 and 1940 for Saskatchewan and Alberta. Only by such exclusion could he arrive at the conclusion reiterated in the opening paragraph of his Rejoinder that his combination of reported condition and weather data gave results superior to mine. Even with his exclusions, my results were superior in Manitoba and Alberta; without his exclusions, my results were superior in Saskatchewan as well.

CONCLUDING REMARKS

BY F. H. SANDERSON

The two points of fact raised by Dr. Wilson resolve themselves into one. He holds that in applying the findings of Davis' and Pallesen's study to Saskatchewan and Alberta, allowance must be made for a lag of three weeks in the progress of the crop between Dickinson, N.D., and the Prairie Provinces.

The writer anticipated this objection. Before making his statement, he took the precaution of consulting five specialists in the area, professors of field husbandry and experts at representative experiment stations ranging from Saskatoon to Edmonton and Lethbridge. All five agreed that the average date of heading of spring wheat throughout this region is practically the same as at Dickinson, namely about July 10. The writer's conclusions are therefore fully applicable to the two Prairie Provinces.

The point which emerges most clearly from Davis' and Pallesen's study is precisely that the critical period is centered about three weeks prior to heading and that the beneficial effect of rainfall during the filling stage is negligible.

Dr. Wilson's concluding remark is partly incorrect[1] and partly unsubstantiated.[2] The issues are now squarely before the reader. In his original statement, Dr. Wilson has contended that the new wheat condition figures, based on his weather-yield analysis, are at a 7:3 advantage over the condition reports previously obtained from crop correspondents. To substantiate his contention, Dr. Wilson (1) adjusts the reported condition figures, thereby reducing their reliability as indicators of final yield; (2) excludes certain observations from his weather-yield analysis; (3) discards the regression method of interpreting condition; (4) disregards the possibility of adjusting condition for the lag-effect of certain weather factors. Yielding on one point, he then accepts the regression method as a yardstick for the July 31 report, but rejects any evidence based on the May 31 and June 30 reports. It seems that in his discussion, Dr. Wilson has not substantiated the validity of these procedures.

EDITOR'S NOTE.—After a year of correspondence between the parties involved, the Editor has found it necessary to terminate this discussion by arbitrarily limiting further argument to about four pages and allocating this space in the above proportions.

Two points of disagreement remain.

Dr. Wilson has requested inclusion of the following data secured from the official records of nine Dominion Experiment Stations showing the average dates of first cutting over the past sixteen years:

Morden, Manitoba	Aug. 4	Swift Current, Saskatchewan	Aug. 13
Brandon, Manitoba	Aug. 15	Beaver Lodge, Alberta	Aug. 28
Indian Head, Saskatchewan	Aug. 22	Lacombe, Alberta	Aug. 31
Rosthern, Saskatchewan	Aug. 21	Lethbridge, Alberta	Aug. 8
Scott, Saskatchewan	Aug. 22		

Mr. Sanderson counters with a statement that these data are not relevant, there being considerably greater dispersion in the average dates of harvest than in the average dates of heading, and takes further exception to Dr. Wilson's interpretation of these data. There seems no way of reaching an early agreement on this point.

The second center of disagreement regards Mr. Sanderson's first numbered point in the final paragraph of his Concluding Remarks. Mr. Wilson writes "... no adjustment whatever was made in the reported condition figures in that comparison." It does not appear from Mr. Sanderson's correspondence that this statement is accepted by him. It would seem that they are not talking about the same comparison.

The value of a discussion of this sort lies in the advancement of scientific procedures. The Editor believes that only the test of time and actual future experience can put a period to this discussion.

[1] Compare this JOURNAL, December 1942, Table IV, page 492.

[2] Manitoba accounts for only 13 per cent of the Canadian wheat crop; the inclusion of this province would therefore make little difference in the total result.

REPORTS OF THE ASSOCIATION

Report of the Board of Directors

The activities of the American Statistical Association during 1943 have been for the most part of the sort described in military communiques as a "holding action." A little ground gained here, a little lost there, a situation at the year's end much like that at its beginning. The Nation's preoccupation with winning the war and laying the groundwork for the eventual peace was reflected in the concentration of the Association's members on their individual contributions to those objectives. Of necessity, these priorities have greatly reduced the time and energy available for the Association's activities as such. The Association's long-range, continuing projects and much of its internal program have temporarily been held in abeyance pending the day when it is again possible to pick up the threads of peacetime living.

At the same time that the Association has deemed it appropriate to curtail many of its own immediate projects and plans, statistical activity in this country has reached new levels of intensity and importance. Urgent problems of manpower utilization and draft, of materials allocation and supply, of munitions requirements, scheduling and production; tremendous readjustments in our national economy, in its economic, business and social organization; enormous demands upon all the physical and natural sciences for discovery and development at unprecedented rates—these problems in their many ramifications have all presented a great challenge to statisticians. The challenge has been and is being met. The Association may take pride in the role played by members of the statistical profession in the Nation's war effort.

Because of the cancellation of the 1942 Annual Meeting it was impossible for the Association to follow its customary procedure in the election of its officers for 1943. The Association's Constitution provides that "the Board of Directors shall fill vacancies in any office and in its own membership until the next Annual Meeting." With that provision as its authority, the Board of Directors at its first meeting in 1943 accepted the resignations of the 1942 officers and of the Directors whose terms should have expired at the Annual Meeting in 1942, and appointed to the vacant offices the candidates proposed by the Nominating Committee.

As in 1942, your officers have responded to the increased transportation emergency by foregoing a national Annual Meeting. The following summary of the Association's work and general welfare, customarily presented at that meeting, outlines the activities which, even in a period of retrenchment, have been carried on during 1943.

The Chapters. The activities of the Chapters during the year have evidenced a recognition of the increased responsibility of those groups for

furthering the Association's program. Statistics in the various phases of war activity, and in relation to anticipated postwar problems, have afforded the material for much extremely worth while Chapter discussion. Regional meetings, in place of a national Annual Meeting, under the auspices of the respective local Chapters are being planned in New York City, Washington and Chicago. An active new Chapter has been established in Denver.

Several of the Chapters have initiated or continued programs for appraising state and local statistical work, and others have sponsored special short courses in new methodological developments, especially in the control of quality in production. Other groups of Association representatives and members in several sections of the country, although not under the sponsorship of any particular chapter, have also been active in conducting seminars and short courses in quality control with particular reference to munitions production.

The Biometrics Section. A meeting of the Biometrics Section was held in Columbus, Ohio, during February. Financial support for this meeting was contributed by the Division of Biology and Agriculture of the National Research Council. Held in conjunction with a meeting of phytopathologists concerned with war problems, the conference was attended by entomologists, phytopathologists and biometricians. Its program was centered around a collaborative study of the more efficient use of war-scarce insecticides and fungicides. A memorandum describing research needs, developed at this conference, was later distributed in mimeographed form with the cooperation of the Connecticut Agricultural Experiment Station, and received widespread attention. Other activities of the Section during the year were directed toward the planning of meetings with other groups of scientists, some of which it is hoped may be held in 1944.

Pressure of war work necessitated the curtailment of much of the Association's committee activity, but several committees have functioned effectively during the year.

Census Advisory Committee. The Census Advisory Committee met in January, April and August for two-day meetings. At the January meeting, the Committee reviewed the programs of the Bureau of the Census brought into prominence by wartime needs for statistical data. These included the extension and development of statistics on foreign trade, basic materials, business, industry and governments. The current manufactures reports program was of special interest because of the needs of the war production program. Main emphasis at the April meeting was upon the Census of Agriculture scheduled for 1945, and upon problems involved in conducting this census under wartime conditions. It was the consensus of the Committee that more careful study should be given to general census plans before making specific recommendations concerning a number of important questions relating to the agriculture census. The August sessions were devoted primarily to a consideration of the over-all program of the Bureau with emphasis on wartime and postwar statistics.

After consideration of all phases of the Census program the Committee adopted a resolution urging the Director "to exert every effort to obtain authorization and funds for the initiation of the Census Bureau's statistical reporting program designed to provide business, industry, labor and government with basic information on a current basis for war and postwar purposes." The Committee stated that in its judgment the expenditure required for the initiation and maintenance of an adequate statistical reporting program would represent a sound national investment, the lack of which will be infinitely more costly in terms of economic and human resources.

At all three meetings vital records and vital statistics were discussed as a continuation of the discussions at the meetings of the previous year. At the January meeting a progress report was made on the problem of National Population Registration and Vital Records. The Advisory Committee of the Census passed a resolution favoring the strengthening of the existing vital records organization of the country at national, state, and local levels. By the time of the April meeting of the Committee, a report of the Commission on Vital Records had been made. The Census Advisory Committee had occasion to disagree with the recommendation of the Commission and passed a resolution recommending that "in the formulation of an extended vital records program the Bureau of the Census continue as the agency responsible for developing and compiling vital statistics whether or not the responsibility for the entire vital records program is placed in that Bureau." By the time of the August meeting a report had been made by the Bureau of the Budget recommending again the inclusion of both vital records and vital statistics in a vital records office placed in the Public Health Service. Although the Committee did not feel that this report offered the best solution, no further action was deemed necessary at this time.

Committee on Census Enumeration Areas. Correspondence with committee members and key persons in various census tract cities has continued throughout the year. The program of the Committee for the immediate future includes two principal objectives: (1) further to inspire individuals located in each census tract city to use census tracts more fully in the solution of the various problems involving the life of the community, and (2) to extend each area already laid out in census tracts to include the entire community as well as the central city.

Joint Committee on Occupational Classification. This Committee's technical subcommittee on clearance of new titles incorporated in the United States Employment Service Occupational Dictionary has continued its functions. Members of the Committee have also served on a technical subcommittee of the Bureau of the Budget which has proposed a tentative occupational classification for the reporting of employees in the Executive Branch of the Federal Government. This classification is, in general, convertible to the Convertibility List of Occupations adopted by the Committee in 1939, and will permit comparisons of the occupational distribution of workers in the Federal Government and in private employment.

Committee on the Bureau of Labor Statistics' Cost of Living Index. In May,

the President of the Association, at the request of the Department of Labor, appointed a special committee to review and appraise the construction and uses of the Bureau of Labor Statistics' Cost of Living Index. This Committee, working with its own technical assistants and the cooperation of the Bureau, presented its report to the Secretary of Labor a few months later. The report has had a wide distribution, and has been published in full in this JOURNAL.

Other Committees and Representatives. At the request of the Foundation for the Study of Cycles, an Advisor from the Association was appointed to that organization.

Through its representatives, the Association also participated in the work of the Social Science Research Council, the National Bureau of Economic Research, the American Association for the Advancement of Science, the Advisory Board of the *American Year Book*, the Advisory Committee to the Census Library Project and the American Documentation Institute.

During the year the Joint Committee on Relief Statistics, the Advisory Committee on Morbidity Statistics and the Advisory Committee to the National Roster of Scientific and Specialized Personnel were discharged with the appreciation of the Association.

Publications. Quarterly issues of the JOURNAL and BULLETIN were published during the year. A number of papers scheduled for presentation at the cancelled 1942 Annual Meeting were printed in various issues of the JOURNAL. Departing from traditional procedure, the report of the special Committee of the Association on the Cost of Living Index of the Bureau of Labor Statistics, referred to above, was made available as a preprint considerably in advance of its appearance in the December issue of the JOURNAL. Short articles of particular timeliness on statistical training in connection with war programs were published in the BULLETIN.

Membership and Finances. During 1943 there was a continuation of the downward trend in the Association's membership from its high point in 1941. Although the total number of names removed from the membership list for reason of death, resignation or failure to pay dues was slightly lower than in 1942, the number of new members joining during the year was also smaller than in the preceding year, resulting in a net decrease of approximately 150 in the membership of the Association.

Income from dues during the year necessarily reflected the losses in membership, falling almost $1,000 below the amount of such income in 1942. Income from JOURNAL advertising and the sales of back issues of the JOURNAL also fell below the figures for the preceding year. However, through reductions in total wages and salaries, stringent economies in office expenditures, reductions wherever possible in other items of expense, and the generosity of the American University in providing the Association with office space during the first half of the year, the Association closed the year with an excess of receipts over expenditures of more than $1,000. No funds were withdrawn from the Centenary Sustaining Fund. The balance in this fund at the close of the year was $5,670.81.

Outlook for the Future. Events are moving swiftly as this report is written in the last days of 1943. By the time that it appears in print, military actions may have provided an indication of how much longer our country is to be at war. But whether that period is to be a long or a short one, the tremendous problems beyond the day of armistice are already deeply foreshadowed. In the period of continued readjustment that lies ahead for the Nation, the questions posed the statistician will continue to be on matters of the deepest import for the national welfare.

Your officers feel that the Association must not continue to pursue too long the policy of retrenchment and curtailment which has for the past two years seemed its wisest course. The implications of the membership trend are not necessarily only that the war has taken a toll. Opportunities for effective service and leadership must not be passed by. New fields of subject and of method have been developed during these war years. If the Association is to have a real part in making them most productive in the postwar peace, it must prove its adaptability and its vision.

HENRY B. ARTHUR	LESTER S. KELLOGG
THEODORE H. BROWN	SIMON KUZNETS
E. A. GOLDENWEISER	WALTER A. SHEWHART
F. LESLIE HAYFORD	FREDERICK F. STEPHAN

Report of the Secretary

During 1943 the total membership of the Association declined from 3,037 to 2,883, a net loss of 154 members. During the year, 189 new members were elected and 20 former members were reinstated. One hundred and forty-two members resigned; 207 members were removed from the active rolls for failure to pay dues; and 14 members were lost by death during the year, including two Fellows. By the end of the year, 161 members had reported to the Association that they were privates or non-commissioned officers in military service, and at least 75 members were commissioned officers.

The death of the following members was recorded during the year: Edward L. Dodd and Horace Secrist, *Fellows;* S. Chapman and George H. Van Buren, *Senior Members;* Paul T. Cherington, Roy E. Dennis, William Eckerstrom, David P. Haber, Robert Henderson, Joseph C. Rocca, Giles M. Ruch, Mark A. Smith, Richard B. Smith and Madeline Tregaskis, *Regular Members.*

Membership Statement, December 31, 1943

Honorary members	14
Corporate members	4
Fellows	117
Regular members	2,748
Total membership	2,883

One Fellow was a Contributing Member during 1943. Two new Life Members were elected during the year, bringing the total number of Life Members to 39.

LESTER S. KELLOGG, *Secretary*

Report of the Committee on Fellows

During 1943 the Committee on Fellows elected ten members of the Association to Fellowship. This was in accord with earlier decision by the Association that the number of Fellows should be slowly increased toward a maximum of one hundred and fifty. Those elected this year were:

Thomas C. Atkeson, *U. S. Bureau of Internal Revenue*

Merrill K. Bennett, *Food Research Institute*

Arthur F. Burns, *National Bureau of Economic Research*

Cecil C. Craig, *University of Michigan*

Churchill Eisenhart, *University of Wisconsin*

George B. Roberts, *National City Bank of New York*

Richard E. Scammon, *University of Minnesota*

Arthur R. Tebbutt, *Northwestern University*

George Terborgh, *Machinery and Allied Products Institute*

Holbrook Working, *Food Research Institute*

At the beginning of 1943 there were one hundred and nine living Fellows. During the year two died.

W. L. CRUM, *Chairman*

Report of the Treasurer

During 1943 the Association's income from regular sources totalled $18,347, a decrease of almost $1,300 from the 1942 figure. Almost $1,000 of the decrease was accounted for by the decline in membership and consequent lower revenue from dues. Subscriptions, which dropped considerably in 1942, improved slightly during 1943.

Because of the necessity which arose in June for moving the Association's office from the American University to its present location, an unbudgeted expenditure of $375 for rent was incurred. The increase in 1943 over 1942 of $177 for office supplies, printing and mimeographing was due to payment of $256 for printing which ordinarily would have been paid in 1944. On a strictly comparable accounting basis the 1943 total for this item is $79.30 less than in 1942. "Miscellaneous expense" includes an unbudgeted expenditure of $149.27 incurred in moving the office. Practically all other items of expense showed substantial reductions from the corresponding 1942 figures. The major decrease, as mentioned in the *Report of the Board of Directors*, was effected in salaries and wages, which were reduced more than $1,400. This saving resulted from a reduction in personnel made possible by longer hours and the assumption of greater responsibilities by staff members. The cost of the BULLETIN was reduced by almost $350 from 1942.

In spite of unbudgeted expenses, the total expenditures of the Association were reduced more than $1,900 in 1943. Notwithstanding losses in income, the result of this curtailment was an excess of income of more than $1,000 which was carried to surplus at the end of the year.

No funds were appropriated from the Centenary Sustaining Fund during the year. Withdrawals from this fund were made in 1940 and 1941, but none has been made in 1942 or 1943. The total of $5,670 now in the fund, which will be further increased by final payments pledged for 1944, may provide the financial basis for a resumption of expanded Association activities.

The balance sheet and other detailed financial statements, with comparisons for 1942, are included in the Report of the Auditors.

LESTER S. KELLOGG, *Treasurer*

Report of the Auditors

To the Board of Directors of
American Statistical Association

We have examined the balance sheet of the American Statistical Association as of December 31, 1943 and the statements of income and surplus for the year then ended. Our examination was made in accordance with generally accepted auditing standards applicable in the circumstances, and included such tests of the accounting records and other supporting evidence and such other procedures as we considered necessary.

The recorded cash receipts for the year were traced to the deposits shown on the bank statements and the amounts for dues and subscriptions were tested with the membership and subscription records. The paid checks and relative vouchers were inspected in support of the cash disbursements for the year. The cash balances and the securities owned at December 31, 1943 were confirmed by inspection or by certificates obtained direct from the depositaries. We did not check the membership and subscription records in detail or make any independent verification of the inventory of old journals, the office records of which are based in part on data assembled in prior years, no recent physical inventory having been taken.

The life membership reserve is computed on the basis of the combined annuity table of mortality with assumed interest at 4% per annum and an assumed annuity of $5.00 per life member, in accordance with a resolution of the Board of Directors on March 31, 1936. The amount treated as income in each year represents the excess of the reserve at the beginning of the year plus interest for the year and new life membership receipts over the required reserve at the end of the year.

In our opinion, the accompanying balance sheet and related statements of income and surplus present fairly the position of the American Statistical Association at December 31, 1943 and the results of its operations for the year, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

PRICE, WATERHOUSE & Co.

Washington, D. C.
March 11, 1944

AMERICAN STATISTICAL ASSOCIATION
BALANCE SHEET

Assets	December 31, 1943	December 31, 1942
Cash in bank and on hand	$ 7,599.72	$ 6,547.86
Accounts receivable	542.85	262.84
Investments:		
United States Savings Bonds, Series D, at redemption value	5,481.00	5,320.00
Stocks, at cost (at market quotations $4,460. and $4,125, respectively)	5,793.50	5,793.50
Inventory of old Journals, at approximate cost	1,668.70	1,655.58
Furniture and equipment, at cost less depreciation	417.04	479.49
Deferred charges (expenses applicable to subsequent year)		255.57
	$21,502.81	$20,314.84
Liabilities		
Accounts payable	$ 1,345.65	$ 1,491.30
Centenary Sustaining Fund, per statement	5,670.81	4,802.97
Life membership reserve	2,455.68	2,341.53
Deferred credits (collections applicable to subsequent year):		
Dues	3,533.07	4,753.67
Subscriptions	2,097.50	1,572.67
Contributions		41.00
Surplus, per statement	6,400.10	5,311.70
	$21,502.81	$20,314.84

AMERICAN STATISTICAL ASSOCIATION
INCOME STATEMENT

	Year ending December 31, 1943	1942
INCOME:		
Dues—current year	$12,775.00	$13,765.50
Dues—prior years	130.50	70.00
Life memberships	179.51	166.89
Subscriptions	3,352.50	3,277.25
Advertising	656.83	950.19
Reprints	617.48	404.50
Journal sales	306.65	635.75
Index to the Journal, sales	12.00	23.50
Special publications	46.97	63.76
Miscellaneous	67.75	110.95
Dividends and interest (after deducting $92.63 in 1942 and $93.66 in 1943 apportioned to life membership reserve)	197.42	164.79
	$18,342.61	$19,633.08
EXPENSES:		
Journal—printing, mailing and reprints	$ 4,685.56	$ 4,852.81
Bulletin	381.79	726.95
Salaries and wages	9,699.14	11,111.07
Unemployment compensation tax	110.60	233.40
Rent	372.17	
Office supplies, printing and mimeographing	646.81	470.11
General postage and carriage	435.62	454.40
Telephone and telegraph	188.31	141.43
Travel expense—officers	253.85	246.49
Mimeographing—committees		41.09
Storage of old Journals	72.00	72.00
Cost of old Journals, sold	26.88	204.33
Miscellaneous expense	295.88	307.58
Depreciation of furniture and equipment	73.60	84.62
Survey of defense statistics		325.32
	$17,242.21	$19,271.60
Excess of income over expenses, carried to surplus	$ 1,100.40	$ 361.48

AMERICAN STATISTICAL ASSOCIATION
SURPLUS STATEMENT

	Year ending December 31, 1943	1942
Balance at beginning of year	$ 5,311.70	$ 4,973.72
Add—Excess of income over expenses for the year, per income statement	1,100.40	361.48
	$ 6,412.10	$ 5,335.20
Deduct—Appropriation to Centenary Sustaining Fund of amount equal to net proceeds from sales of Index to the Journal	12.00	23.50
Balance at end of year	$ 6,400.10	$ 5,311.70

STATEMENT OF CENTENARY SUSTAINING FUND

	Total	Year ending December 31, 1943	Prior to 1943
Contributions and pledges (relating to the support of the activities of the Association for a period of five years from January 1, 1940 to December 31, 1944)	$10,686.02		
Less: Pledges not collected at December 31, 1943 including $582.50 not due at that date	960.00		
Amounts received from contributors	$ 9,726.02	$756.25	$8,969.77
Interest received on bank savings account and increase in redemption value of securities	331.17	99.59	231.58
Appropriation from surplus of amount equal to net proceeds from sales of Index to the Journal	390.15	12.00	378.15
Total receipts	$10,447.34	$867.84	$9,579.50
Less: Expenses of campaign (printing, postage and temporary assistance)	776.53		776.53
Net receipts	$ 9,670.81	$867.84	$8,802.97
Appropriations by the Board of Directors to the general account of the Association in accordance with the budget:			
Year 1940 $1,500.00			
Year 1941 2,500.00	4,000.00		
Balance December 31, 1943, per balance sheet	$ 5,670.81		

List of Committees and Representatives for 1943

Committee on Fellows[1]

W. Leonard Crum
John Rice Miner
Theodore H. Brown
Lowell J. Reed
Joseph S. Davis

Committee on Nominations

F. Leslie Hayford, *Chairman*
F. L. Carmichael
Douglas E. Scates

Committee on Investments

F. Leslie Hayford, *Chairman*
George O. May
Walter W. Stewart

Biometrics Section Committee

C. I. Bliss, *Chairman*
Churchill Eisenhart, *Secretary*
Alva E. Brandt
William C. Cochran
Gertrude M. Cox
Alfred J. Lotka
Hugo Muench, Jr.
J. Neyman
Lowell J. Reed
George W. Snedecor

Census Advisory Committee

William F. Ogburn, *Chairman*
Murray R. Benedict
Paul T. Cherington*
J. Frederic Dewhurst
Luther Gulick
Frederick F. Stephan
Willard L. Thorp

Committee on Census Enumeration Areas

Howard W. Green, *Chairman*
Clarence E. Batschelet
W. Thurber Fales
Ernest M. Fisher
Shirley K. Hart
Charles S. Newcomb
Vergil D. Reed
Leon E. Truesdell
Lent D. Upson

Joint Committee on Occupational Classification

Gladys L. Palmer, *Chairman* and *Secretary*
E. Dana Durand
Meredith B. Givens
Edward D. Hollander
Merrill G. Murray
Leon E. Truesdell
Emmett H. Welch

Committee on Chapters

Henry B. Arthur, *Chairman*
Edwin B. George
Lester S. Kellogg
William A. Sturm
Charles W. Vickery, Jr.
Robert R. Williams

[1] With terms expiring at the end of 1943, 1944, 1945, 1946, and 1947, respectively.
* Deceased.

Committee on Sampling

Frederick F. Stephan, *Chairman*
W. Edwards Deming
George W. Snedecor
Alfred N. Watson
Samuel S. Wilks
Theodore O. Yntema

Budget Committee of the Board of Directors

F. Leslie Hayford, *Chairman*
Frederick F. Stephan
Walter A. Shewhart

Committee on Problems Relating to Sections

F. Leslie Hayford, *Chairman*
C. I. Bliss
Lowell J. Reed
Walter A. Shewhart

Representative on the Board of Directors of the National Bureau of Economic Research

Frederick C. Mills

Members of the Social Science Research Council[2]

Edwin B. Wilson
O. C. Stine
Frederick F. Stephan

Representative on the Council of the American Association for the Advancement of Science

Walter A. Shewhart

Representatives on the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing

Walter A. Shewhart
Churchill Eisenhart

Representative on the Sectional Committee on Standards for Graphic Presentation

A. H. Richardson

Committee to Advise the Bureau of Labor Statistics on Its Cost of Living Index

Frederick C. Mills, *Chairman*
E. Wight Bakke
Samuel Stratton
Reavis Cox
Theodore W. Shultz

Member of the American Documentation Institute

Richard L. Funkhouser

Representative on the Advisory Board of the American Year Book

Frank W. Notestein

Representative on the Advisory Committee to the Census Library Project

Richard O. Lang

Advisor to the Foundation for the Study of Cycles

W. Edwards Deming

[2] With terms expiring at the end of 1943, 1944, and 1945, respectively.

BOOK REVIEWS

GLENN E. MCLAUGHLIN, *Review Editor*

Redirecting Farm Policy, by Theodore W. Schultz. New York: The Macmillan Company. 1943. vii, 75 pp. $1.00.

This germinating little book is excellent in title and quietly revolutionary in content. Its penetrating criticisms and constructive ideas amply merit pondering in their bearing on public policy, even beyond the realm of agriculture.

The author seeks basic, comprehensive "economic directives" to coordinate otherwise conflicting programs and to guide "(a) the use of resources, and (b) the size, distribution, and use of incomes of farm people, and (c) the distribution of the food supply among consumers in such a way as to serve the general interest best."

Serious weaknesses in parity concepts and formulas are brought out. Taking parity prices as ends has led to "a crisis in agricultural policy centering on prices." "Prices must be seen and employed as economic directives and not as goals." In peace or war, deflation or inflation, prices are "by all odds the most basic and far-reaching administrative technique yet devised for directing and coordinating both the production and distribution of the food supply." But they must be flexible and "forward-looking," not tied to the past and into the future, as legislative formulas now tie them.

Improving the management of agricultural resources and improving farm income and its distribution are essentially distinct objectives, not identical or closely interlinked as commonly assumed. The author makes positive proposals toward both.

On the production side, he urges extensive use of production goals and "forward prices," designed to keep farm production in line with food needs and to minimize economic uncertainty in farming. He argues for "administering" prices of farm products in such ways that farmers would know, before the beginning of each production period, what they could count on getting for what they produce in that period. He favors various auxiliary devices: official stockpiles, flexibly built and used to even out the results of miscalculation and vagaries of the weather affecting supply; equalization funds, "one for each of the various clusters of farm commodities," to make adjustments for unpredictable variations in demand; and subsidized surplus disposal.

On the income side, the author's proposals are limited but not cautious. Implicitly approving supplementing farm incomes, in accordance with "social welfare criteria," he suggests four rules: (1) avoid making grants-in-aid according to production, for such tend to be regressive; (2) make grants not in cash but in kind—food, housing, medical care, education, etc.; (3) make them available on equal terms to all families, regardless of their income

status; and (4) tie the supplemental income to the farm family, the home, and consumption, not to property resources or the farm as a business concern.

"The difficulties in the use of the forward price technique are primarily in the political sphere." Such difficulties are vastly larger than the author appears to admit. Considering political forces, pressure groups, and bureaucratic limitations of various kinds, I see far less practical scope for wise use of administered prices, supplemental devices, and income subsidization than the author's scheme entails—especially for times of peace.

JOSEPH S. DAVIS

Food Research Institute
Stanford University

Food Enough, by John D. Black. Lancaster: The Jacques Cattell Press. 1943. vii, 269 pp. $2.50.

The title of this book is short and relatively simple, but its subject matter concerns the complicated task of growing enough food of the right kinds and getting it in the necessary proportions with proper timing to our armed forces, our war workers, and our civilian families, as well as doing our share toward feeding our allies and the people of freed nations. The central generalization of the book is to the effect that "no *physical* reasons exist why food enough cannot be produced, processed, and moved into consumption" for such purposes. If this objective is not reached, "the reasons will not be physical, except as bad weather may be a factor in it. They will be *human*," and will relate to inadequacies in the order and organization of the task.

First claim on the food produced is rightly given to the armed forces, but questions are raised as to the efficiency with which the task is being done. The author feels that our war plant workers are not being properly fed, and that the war effort is definitely retarded on account of the fact. With regard to feeding the civilian population of this country, "the division of purposes between producer and consumer, and agriculture and labor, and distributors and the public must cease." There is not enough information available to distribute intelligently the food available to our allies and other friendly nations under lend-lease. The food situation in Germany, at least so far as the military is concerned, is not critical. The chief deficiency is in fats and oils.

A number of conclusions in the book will not meet favor with the farmers generally nor with the "farm bloc." Farm income, except in restricted areas of the economy, is viewed as fully adequate, at least under present conditions; farm manpower is sufficient for production needs *if* properly distributed; subsidies are viewed with a rather favorable eye; and the "parity" concept should be banished for the war period at least.

The book is well worth the time of the person who would like to have a comprehensive picture of our food problems. It is not popular reading, for although the author is an able thinker, his books generally are viewed as

difficult in style, and the present one is no exception. Another criticism is the unavoidable one that so accelerated is the present pace of social change that some parts of the book are already out-of-date and many new materials deserve inclusion.

Wilson Gee

University of Virginia

The World Coffee Economy with Special Reference to Control Schemes, by V. D. Wickizer. Stanford University: Food Research Institute, Stanford University. 1943. x, 258 pp. $3.00.

This is an indispensable reference work for the coffee student. It presents a wealth of material in an orderly manner. It is particularly effective in bringing out the inertia of demand, the extreme variability of supply, and the extra hazards of political expedients. It leaves one questioning whether the tremendous forces of economics and psychology can be controlled by man-made devices.

In his discussion of the Inter-American Coffee Agreement the author indicates rather clearly that generosity, even with the best intentions, should be tempered with canniness. If the United States consumer should refuse continued acquiescence in having the cost of his favorite matutinal beverage forced upward (for example, by minimum export prices in Colombia and Brazil), how much gratitude will remain for his previous complaisance? Rigging the market, moreover, is costly for the producer in the long run as well as for the consumer.

The judgments expressed are discriminating, for instance, the implication that if production continued to expand in Colombia over a period of eight years the prices prevailing during that period must have been reasonably encouraging.

Some other virtues deserve special mention, such as the statistical chart inside the cover. On the other hand, certain readers may feel that a few matters could have been handled better. This reviewer would prefer to have all tables adequately explained in their own headings rather than in the text of the preceding paragraph. The book is written in a good, clear, readable style, but is sometimes irksome from the writer's unwillingness to trust the reader's imagination.

The least satisfying part of the study is its discussion of production costs. The investigator could have found in United States consular reports better and later data than he used. Brazilian fazenda reactions to various sacrifice quotas indicated a cost base generally below a milreis a kilogram instead of considerably higher.

The author undoubtedly realizes the incomplete value of the statistics available. For reasons that were presumably adequate he does not warn the reader that some crop years date from July first and others from October first; that the time lag is important in comparing export and import statis-

tics; that exchange regulations make price records difficult to interpret. Such criticisms, however, seem unimportant in face of the thoroughness of Mr. Wickizer's work and the evident resourcefulness of the Food Research Institute.

CAROL H. FOSTER

Washington, D. C.

World Trade in Agricultural Products, by Henry C. Taylor and Anne Dewees Taylor. New York: The Macmillan Company. 1943. xviii, 286 pp. $3.50.

In this volume Professor and Mrs. Taylor have provided background material needed for an understanding of some of the factors underlying the basis for the establishment of a "peace that will endure for many generations to come." This book is an outgrowth of a plan conceived by Professor Taylor, when he was the United States member of the Permanent Committee of the International Institute of Agriculture in Rome, for preparing a general review of the role agriculture played in world trade. The Institute had by 1934 accumulated sufficient statistical and other factual data to provide a picture of world trade and policies.

The authors were fortunate in being able to secure the services of Dr. Lois B. Bacon and Dr. Frederich C. Schloemer whose intensive research contributed to the completion of the 1,100 page volume *World Trade in Agricultural Products: Its Growth; Its Crisis; and the New Trade Policies*, published by the International Institute of Agriculture in Rome in May 1940. A summary of this volume was prepared by Dr. Schloemer at the International Institute of Agriculture at Rome, and published by the Institute in German in May 1941. Of this 96-page summary only a few copies reached the United States. However, this summary and the larger book were treated by Dr. and Mrs. Taylor as the basis for the present study "without the use of quotation marks or direct references."

This timely book provides a concise yet comprehensive survey of the facts and figures concerning world trade in agricultural commodities. It also discusses the national policies, the imperial preferences and the international agreements that have influenced the extent, the character and the direction of this trade. The authors call attention to a world agricultural situation which will present problems taxing the best efforts of statesmen, economists, farmers and business men to find adequate solutions.

The material is well arranged and clearly presented. Each major commodity is treated in a separate chapter which is accompanied by charts, maps, and good statistical tables which supply data on world imports and exports by countries. The commodities so treated are: cotton, wool, silk, rubber, tobacco, coffee, tea, sugar, wheat, rice, feed grains, meat and live animals, fats and oils. The survey of each commodity extends down to the outbreak of the present war. Economists, statisticians, geographers, business men,

government officials, and others interested in agricultural commodities important in world trade should find this a readable useful volume.

Joseph S. Gould

University of Delaware

Treatment of Experimental Data, by Archie G. Worthing and Joseph Geffner. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. 1943. ix, 342 pp. $4.50.

The reviewer is in the awkward position of having agreed to write the review and then realizing after the book was received that he himself had just written one on the same subject, published by the same publisher, and is therefore in position to appreciate a few kind words. One must admire the enthusiasm of the authors for their subject. Their delight in writing about it glistens through the lines. However, one might insist that something more than "a long series of irritations" (preface) should impel an author to do such a dastardly thing as to write a book. Although there are many good points of science in it, and while many of the methods expounded are correct and useful, the book is a disappointment to anyone looking for either something new in methods or a compilation of old ones. It is an example of what can happen when a good scientist without statistical training attempts to write in statistics; the results can be expected to approximate what a statistician without engineering training would produce in the field of engineering. Many of the devices expounded are crude, even when simpler and more elegant ones could have been copied from existing literature. Unfortunately, many statements are even incorrect. There is a paucity of advice to the reader, and some of that little is bad. A large part of the book seems to be a museum with little bearing on the title. The subject of least squares is stated in as many ways as there are types of problems, whereas in reality it can be stated once for all and the procedure unified.

A few examples will illustrate the foregoing remarks. As for incorrect statements, an unfortunate propagation of error occurs on page 263 where it is stated that "It is sometimes possible to obtain more than one least squares value for a given constant by using the same basic relation differently." The same thing occurs on page 247 where it is stated that "The three methods [three ways of writing the equation] will normally yield different best values . . . ." Apparently the authors missed seeing papers by R. Meldrum Stewart in 1920 (*Phil. Mag.*, vol. 40) and Horace S. Uhler in 1923 (*J. Optical Soc.*, vol. 7), and even forgot their own advice on page 249 where they say (correctly) that by taking account of the change in weight upon taking logarithms or otherwise altering the form of the relation, only one set of values will be obtained. There is a perfectly straightforward procedure, yielding unique results, regardless of the form used for the relation to be fitted, and it is a pity that it was not included. The authors also forgot their own advice on page 248 when calculating the weights of the logarithms; what they calculate is the weights before taking logarithms.

There is no mention of the adjustment of observations in curve fitting; which probably accounts for the absence of connection between curve fitting and other problems to which least squares is applied.

Closely related to this apparent lack of appreciation of the principle of least squares is the curious contrivance for fitting a line when both coordinates are subject to error (page 259). The result derived is valid when the x coordinates have the same weight throughout, and the y coordinates likewise, which is the only case they consider. Incidentally, it was published by Kummell in 1876, Karl Pearson in 1901, and Gini in 1921. The more general problem wherein the coordinates have any weights whatever, and the fitted relation is of any form linear or otherwise, is also simple enough as it turns out, and has in fact been published. One must admire the authors for recognizing the importance of this problem (too often neglected), but not their solution nor conclusion that there is no way out in more complicated situations. In this connection it may be of interest to point out that Gauss recognized that the least squares criterion for adjustment must sometimes be applied to the weighted sums of squares of unlike quantities, such as x and y coordinates: "Hoc pacto ne necessarium quidem est, ut functiones V, V', V'', etc., ad quantitates homogeneas referantur, sed heterogeneas quoque (e.g., minuta secunda arcuum et temporis) repraesentare poterunt, si modo rationem errorum, qui in singulis aeque facile committi potuerunt, aestimare licet." (Gauss, *Theoria Motus Corporum Coelestium*, Hamburg 1809).

In spite of the authors' expressed fondness for determinants, the Gauss reciprocal matrix is not used for expressing or deriving the weights of adjusted constants for a fitted curve. Instead, derivations are made afresh for specific purposes (pages 229 and 249). As for uncritical advice one may turn for example to page 171, where Chauvenet's criterion is outlined. It is something of a shock to see that "a criterion of rejection is necessary." I had thought that this idea had been decently buried long ago, along with other statistical criteria for the rejection of observations. As for irrelevant material, there are two chapters on the normal curve, which is finally dismissed as one of those things that one never encounters anyhow. Why not merely describe it as a useful mathematical device? The question is not what shape of distribution one has, but whether one has *any distribution at all.* One has no distribution of any kind unless his data show *stability*, a practical criterion for which is contained in the Shewhart control chart methods. No word regarding stability is given in the book.

The usual $n-1$ is replaced by n (page 167) when a single unknown is involved, but $n-2$ is used on page 250 and $n-m$ on page 261. One excuse given on page 167 for using n is convenience, which is acceptable; but another excuse is that the normal curve seldom exists, which is irrelevant. The authors state on page 238 that the method of least squares gives "a best equation of specified type." Again, on page 239, "Granted the type of equation to be used and the weighting of the data, there is no prospect for the obtaining of a more satisfactory equation than that which the least squares

method yields." Just what is meant by best or satisfactory? Perhaps the answer is supposed to be on page 216 where one reads "The treatment of adjustments here given assumes that the measurements obey the normal distribution law. It further assumes that the most probable values for the k unknown adjusted means are those which yield a maximum probability of occurrence for the weighted measured means." Fortunately there are better reasons for using least squares.

In the treatment of interpolation there is no mention of the remainder term and the possible dangers of ignoring it. No reference is made to Aitken's simple iterative procedure for interpolating and extrapolating, and consisting of operations somewhat similar to the criss-cross evaluation of a determinant, which would doubtless appeal to the authors. The Aitken scheme is particularly adapted to the requirements of the casual user of interpolation. The zig-zag rule is not given, yet it forms the basis of all polynomial interpolation, and is as easy to write down and remember for divided differences as for natural differences. The Lagrange formula given on page 21 is correct but awkwardly written.

Reference is made on page 261 to Gauss' criterion for the goodness of fit of a curve. It would be well to point out that this criterion is equivalent to the calculation of chi-square, and this calculation might well be tied up with the treatment of chi-square on pages 182–5. The treatment of graphical integration and differentiation can not be recommended. Simpson's and Weddle's rules are a part of the discipline of mathematicians, but little comfort to the physicist or engineer because of the subtle differential weighting given to the ordinates, and the requirement of uniform spacing. It seems much better to approach the problems of graphical integration through the Euler-Maclaurin sum. It is uncritically stated on page 92 that "graphical methods . . . permit the calculation of derivatives . . . from the original data." Must one not know something about the wiggles that the curve takes between the tabulated points? Again, one must not neglect consideration of the remainder term.

The treatment of Fourier Series propagates an abomination known as Fourier's "half-range" sine and cosine series, which from a pedagogical standpoint is most confusing. The series covers the full period, and to mention a half-range series to the beginner is like telling the children not to put beans up their noses.

The greatest fault is lack of purpose. Why does one wish to fit a curve in the first place? What is he going to do with it when he gets through? Why does one adjust the angles of a triangle? What is the purpose of adjustment? Why does one take data? Why does one wish to present data? As a guide in framing a course of action, of course, or for predicting the result of a future experiment, but one can search the book in vain for the answer.

Several good points deserve mention. On page 58 the authors give a little known device for straightening a curve and thus discovering whether some particular form seems to fit. On page 198 the discussion of constant errors

is excellent. Section 11 on page 200 continues the discussion and is likewise excellent. Numerous interesting problems are given at the ends of the chapters. The summary of each chapter is helpful.

In conclusion the reviewer expresses the hope that Messrs. Worthing and Geffner may have the pleasure of writing a review of his book.

W. EDWARDS DEMING

Bureau of the Census and
Bureau of the Budget

Sampling Methods in Forestry and Range Management, by F. X. Schumacher, and R. A. Chapman. Durham: School of Forestry, Duke University. Bulletin 7. 1942. 213 pp. $2.00.

This book presents a treatment of statistical methods applicable not only to the sampling needs of foresters and range managers, but also to a wide variety of field investigations common to many branches of science and more particularly to biological investigations. The present title may very well tend to keep it out of the hands of many readers who would find it a textbook for which they have been seeking.

The authors have devoted the major part of their energies for the past 15 years to developing objective methods of evaluation of experimental results and fostering the use of better methods of experimentation in this complex field of work. They are among the leaders in this line of endeavor. The present book is the culmination of their joint efforts.

Of special interest to foresters, it should be pointed out that much of the example material is drawn from two fields of work, estimating of timber volume and sampling in forest tree nurseries, concerning which the authors are especially well prepared to write.

The book is divided into three parts: statistical background, direct estimates by sampling, and indirect estimates through regression, and concludes with a discussion of "certain practical aspects of sampling." The development progresses from the simple case of sampling a single variate in a small rectangular area to the sampling of a multivariate population in which increased precision is sought by means of regression and recognition of stratification.

In their treatment of the subjects, the authors have avoided consistently the authoritative type of statement met so frequently in the average elementary textbook on statistical methods. Whenever a principle or formula is used, it is developed algebraically in the text. So thoroughly is this done and for so wide a coverage of the subject, that the book provides a very useful exposition of the algebra of the analysis of variance and covariance. It strikes the reviewer as slightly incongruous, however, to find commonly used terms carefully defined and then encounter a phrase such as "mean square due to regression" defined only by a demonstration of its use.

The authors state in the preface, "Such use as is made of mathematics

in the following pages presupposes no special training in the subject beyond the modest requirements of a forestry curriculum." The reviewer feels, however, that the authors have taken something for granted because, while the modest mathematical requirements of a forestry curriculum may serve as an adequate basis upon which to build, the average forester or range manager would find it necessary to devote considerable time and study to develop his knowledge of mathematics to the point where he could use the procedures outlined with facility. Moreover, their brief discussion of fundamentals would not enable the average worker readily to understand the more complex discussions unless he is already possessed of a reasonable knowledge of statistics. The book, therefore, requires a certain knowledge of statistics to begin with.

The work shows throughout the authors' study of and close adherence to the school of statistical thought led by Professor R. A. Fisher, even to the symbols used.

The treatise implies the use of the random sampling method in estimating timber volume on forest tracts of considerable size and of a regular outline—a problem usually confronted by the "timber cruiser" or "range surveyor." Although random sampling as outlined will no doubt afford a valid estimate of sampling error in timber cruising, it will give no greater accuracy in the estimate of volume than systematic sampling. Then, too, random sampling involves certain mechanical difficulties in pursuing the work on the ground. In the illustration used in the book (figure 18), the random selection of some sampling units (strips), in some cases as little as 200 feet apart in a block having a width of 1600 feet, and as great as 1000 feet apart in other blocks, and leaving unsampled areas as wide as 2000 feet in adjacent blocks, would create doubts in the minds of "practical" cruisers as to the accuracy of the data, at least for the individual blocks. This suggests the need for further attention to the development of methods for determining the valid estimate of sampling error using systematic sampling methods. The results of a preliminary investigation in the use of the systematic sampling method were published subsequent to the time Schumacher and Chapman's treatise went to press (Osborne, James G., "Sampling Errors of Systematic and Random Surveys of Cover-Type Areas," this Journal, June 1942, Vol. 37, pp. 256–264).

The work, however, will find very great usefulness in field experimentation in forest and range investigations and related lines of work. The authors have rendered a real service in assembling in one place the essentials of so much of the widely scattered information and literature on sampling and organizing it into a useful treatment. Altogether, the strong points of this publication far outweigh its weaknesses and the breadth of the application of the principles demonstrated is sufficient that the book is a "must" for workers in forest, range and related fields of experimentation.

C. L. Forsling

U. S. Forest Service

Business Mathematics, by Cleon C. Richtmeyer and Judson W. Foust. New York: McGraw-Hill Book Company, Inc. Second Edition. 1943. xv, 401 pp. $2.75.

Persons with negligible training in mathematics who want to acquire sufficient foundation for practical work or further study in the business uses of mathematics will find this a very useful book. The scope of the book is fairly extensive. Numerous exercises, problems, and self-tests are scattered throughout the book, and in the back are the usual mathematical tables.

A good set of definitions and rules concerning approximate numbers, significant digits, and accuracy and precision in approximate computations is given early in the text. The solution of simultaneous equations is covered, and the derivation of the normal equations required for a problem involving two unknowns by the method of least squares is explained without the aid of calculus. The treatment of annuities is preceded by and grows logically out of a chapter on geometric progressions and compound interest. It includes a treatment of sinking funds, depreciation, amortization, and bonds. How to ascertain the yield of a bond, however, is excluded, as is any consideration of life annuities or insurance.

The chapter on statistics deals only with ungrouped data. Measures of central tendency, measures of variability, standard measures or z-scores, simple correlation, straight line trends, and index numbers are explained and illustrated. The reviewer believes it would have been better if the authors had always put the frequencies in the right-hand column of a frequency table, if they had not adopted such a difficult explanation of correlation, and if they had not ignored the basic idea that index numbers are essentially composites obtained by combining related variables. Also in a book of such a generally elementary character it seems a little unbalanced to develop and extensively apply the technique of least squares, but completely neglect any consideration of frequency distributions or of index numbers.

Perhaps the chief criticism of the book is that the authors appear to be as much interested in mathematics and in the problems of the educational world as they are in the problems of business.

DUDLEY J. COWDEN

University of North Carolina

Consumer and Opinion Research, The Questionnaire Technique, by Albert B. Blankenship. New York: Harper & Brothers. 1943. x, 238 pp. $3.00.

When a new era of social research is opened up the matter usually comes to the attention of the scientific fraternity in three steps. First, concrete studies are reported highlighting specific technical aspects. Then these experiences are combined into "How To Do It" type of books. Finally as the field grows and good methodological thinking is done, it becomes possible to derive the techniques from a few basic principles. The present volume belongs to the second level and shows that the author kept his mind open for whatever could be done on the third level. Blankenship has seen that two fields which

are usually treated separately, to wit; market research and public opinion research, are really the same unit.

In the introduction he gives some useful historical hints and then boils down the rules of the game to thirteen sections. Some of the sections are well established units like sections 5, 6 and 7 on questionnaires, Sections 8 and 9 on sampling, and section 11 on interviewing. In the field of wording of questionnaires, Blankenship did much original research in previous years and it is valuable to have his as well as other material assembled in one book. The chapters on sampling are necessarily sketchy. Perhaps it would have been better if the author had not reproduced again the well known tables on sample size used in random sampling. After all the real problem is that the actual sampling we deal with is much more complex than the present text would lead the reader to expect.

In certain other sections Blankenship has made the first attempt to summarize the current procedures into a set of rules. In Section 3 for instance he tries explicitly to clarify how an administrative problem is translated into terms of research. In Sections 12 and 13 he attempts to make the writing of the report a more systematic process and thus contributes to the "codification" of this new field.

At this point this reviewer might be permitted to give one example as to how the progress from empirical rules to a coherent system can be made. In his section on "Requirements for Classification," Blankenship refers mainly to a set of rules published ten years ago by this reviewer. By now thinking on this problem has progressed to a more advanced level. If we have a few hundred answers to an "openended" question, our classification has to proceed by steps. The first set of categories has to take into account the different ways the question was interpreted by the respondents. Then only can we proceed to classifications relative to the actual content of the replies. All rules or classifications in opinion research can be derived from this basic fact: complex questions always leave room for different interpretations by the respondent. Therefore, we have to classify answers first as to what the respondents thought they were asked. Then subcategories are needed to classify what the respondent meant to answer to the question as he understood it.

Blankenship's effort to gather what research people are actually doing into a coherent set of rules will prove helpful to a great number of people who either want to get acquainted with this new field or are looking for some frame of reference to orient them in the turmoil of their own daily work. Instructors will find in Blankenship's book a welcome supplement, e.g., to Lundberg's *Social Research*, especially with students training themselves for business or government jobs.

Paul F. Lazarsfeld

Columbia University

The Chicago Mental Growth Battery, by Frank N. Freeman and M. A. Wenger. Chicago: The University of Chicago Press. 1943. v, 58 pp. $1.00.

This is a battery of ten group tests for the study of intellectual develop-

ment graded in difficulty for use from the third grade through the twelfth. It includes six verbal and four non-verbal tests, chosen to meet these requirements; namely, that they (a) be generally recognized as suitable for measurement of intellectual behavior, (b) have high positive correlation with the general factor in the bi-factor analysis of the preliminary data, (c) be applicable over a wide age range but demand presumably the same or similar mental processes, (d) be adaptable to multiple-response scoring, (e) have intrinsic interest to the testee, and (f) permit group presentation without imposition of time limits.

The non-language tests are as follows:

1. *Picture sequence.* A disarranged series of cartoons of Uncle Elby and his dog Napoleon.
2. *Pattern analogies.* Most of the items have been taken from the Thurstone material in the American Council on Education Psychological Examinations, with a new set of instructions adapting the items to use in lower grades.
3. *Paper Form Board.*
4. *Series Correction.* A modification of the Army X-O series.

The language tests are as follows:

5. *Problems.* This is adapted from Burt's Test of Reasoning, with the addition of some syllogistic reasoning and items similar to those in the *Army Alpha.*
6. *Vocabulary.* Adapted from the Vocabulary Test in the I.E.R. CAVD scale.
7. *Verbal Analogies.* These items were selected from those standardized by Pintner and Renshaw.
8. *Word Grouping.*
9. *Sentence Completion.* Adapted from the I.E.R. CAVD scale.
10. *Opposites.*

The tests are arranged to permit machine scoring but the authors feel that little saving would be effected thereby unless very large groups are to be examined. A separate answer sheet is not provided nor recommended. The tests are legible and attractive in appearance. They are power and not speed tests. While there is no time limit most subjects can complete them in five sittings of one hour each.

Correlations of the separate tests with the general factor in a bi-factor analysis are fairly high, 22 out of 31 coefficients reported being between .60 and .85 and only three being below .50. The tests were standardized on thirteen different groups totalling 2707 persons, none of whom took all the tests, and a procedure of weighting and equating was devised to secure comparable scales for the ten tests. Each item retained in the final test was scaled by computing the percentage of persons failing the item, and by reading the corresponding value of x/σ from a table of the normal curve. In this way an item would receive a different scale value for each group to which it was

presented. All such scale values for a given item were averaged after each had been transformed by adding to it the amount by which the mean scale value of the Basic Group (grades 3 to 6) exceeded the mean scale value of the group in question.

The authors have set an admirable precedent of presenting the basic data on which each item was scaled and it is a great pity that so few test makers follow this excellent practice. Commercial publication of the battery of tests is not contemplated but a sample may be obtained through the University of Chicago Press at a cost of one dollar and the entire battery or parts of it may be used by permission of the authors.

Helen M. Walker

Teachers College, Columbia University

The Adolescent Criminal, by W. Norwood East. London: J. & A. Churchill, Ltd. 1942. xi, 327 pp. 45 shillings.

This is a report of the findings of a study of 4000 male adolescent offenders, aged 16 to 21 years, received at the Boys' prison from London and its surrounding districts during the years 1930 to 1937. The purposes of the inquiry were, "first, to obtain the fullest information which would enable ample consideration to be given to each case before recommending the lad to the Court of Trial as a suitable subject, on general grounds, for detention in a Borstal institution; second, to ascertain the presence of any mental defectiveness or other mental abnormality which should be reported to the court; third, to utilize the medical data and other factors in the life histories of the lads to assist in the classification of the various types of offenders and to ensure their transfer to the appropriate Borstal institution. . . . The fourth object of the investigation . . . was to apply modern scientific methods to the elucidation of some of the causal factors which contribute to adolescent criminality."

We are assured by the authors that the 4000 offenders studied were unselected except for age, the region in which they lived, and the period of time covered by the investigation. Within these limits they comprise a consecutive series of cases received at the Boys' prison from the courts. The series was limited to offenders from London and its adjacent communities so that their homes could be visited and their relations could be interviewed.

The facts pertaining to each case were secured from personal interviews with the offenders after their reception into Boys' prison, from home visits, medical examinations, psychological tests, questionnaires filled out by school masters, employers, probation and police officers. From all these sources efforts were made to secure facts relative to seven major categories of factors, namely, hereditary and familial factors; home environment; school progress; employment record; physical growth, physical defects, and record of physical disease; intelligence rating, mental defectiveness, and mental disease; and personality traits. After the facts under each of these categories were secured, they were tabulated and their statistical frequency determined for such subgroupings as age, types of offenses, and number of previous convictions.

The authors conclude from their analysis of their data that criminal heredity; certain forms of mental disorders such as schizophrenia, manic depressive psychosis, hysteria, compulsive obsessive neurosis; paranoid types of personality; absence of one or both parents from the home; and unemployment were factors which seem to have causal significance. Except for offenders charged with sex delinquency, there was a significant correlation between multiple convictions and residence in a poor class district. The cases of sex offenders showed no such correlation.

This study represents an extensive and conscientious attempt to discover the physical, mental, and social factors associated with adolescent criminality. It contains a wealth of statistical material which should be of great value to students of the problem. It should be stated, however, that since the incidence of the variables considered is not known with respect to the general population, or the non-criminal population, there is great difficulty in establishing their significance as causal factors in the lives of delinquents.

CLIFFORD R. SHAW

Institute for Juvenile Research

War Labor Supply Problems of Philadelphia and Its Environs, by Gladys L. Palmer, assisted by Samuel M. Cohn. Philadelphia: University of Pennsylvania, Industrial Research Department of Wharton School of Finance and Commerce. Research Report No. 5. 1942. vii, 54 pp. 50 cents.

This fifth report in the series issued by the Industrial Research Department of the Wharton School seeks to describe major changes in the Philadelphia labor market during 1940 and 1941, changes resulting from the defense and war production programs. The study covers the period from June 1940 to April 1942, although much of the statistical material is restricted to the months before January 1942. It was undertaken to discover what major problems must be faced in mobilizing the manpower of this particular area for war.

The authors first considered shifts in employment necessitated by changing demands for labor. They then appraised the major difficulties involved in making these manpower conversions, including reasons for labor immobility, frictions in local wage structures, and limitations in housing facilities.

Attention was next directed to means by which expected demands for labor could be met. Note was made of the obviously increased use of public employment exchanges as a means of facilitating and directing transfers, as contrasted with a declining dependence on "help-wanted" advertising. One important means of facilitating transfers, they conclude, would involve the relaxation of hiring specifications and discrimination against Negroes, women, and both younger and older workers. Means of increasing labor supplies by calling on potential reserves and improving the efficiency of manpower utilization are also considered, and attention is directed to the possibility and desirability of in-migration to augment local labor supplies.

An entire chapter is devoted to a comparison of labor supply situations in this war with that in World War I. The authors conclude that labor is much more mobile now, principally because of improved commutation facilities. They find that shortages of unskilled labor have been definitely less serious in early stages of this war, and that there has been less demand for additional women workers. Finally, they note the wider use of public employment services in 1941–42 as compared with 1917–18.

A final brief section describes five "immediate" labor supply problems in the Philadelphia area, including those arising out of limitations on transportation facilities; traditional hiring and union membership restrictive practices; inadequate training facilities and programs; neglected opportunities for the employment of women, older workers and the physically handicapped; and the limited provision of facilities for effecting transfers from less essential to more essential work.

The study is already an interesting historic document on the early phases of manpower mobilization. Many of its conclusions might now be questioned, as, for instance, those holding that the present war shows a lessened demand for unskilled workers, for women, or for minority groups or handicapped workers, or that there is less labor turnover in the present conflict. The study reflects the continued inadequacy of even the most important labor market statistics. At several points, as, for instance, in discussing "inmigration," the authors simply state that realistic data were not available.

There is some evidence of the pressure of war in the preparation of this study. Several of the charts are confusing and poorly designed. There are careless statements, such as that (on page 5) which declares that when industrial production reached an all-time high in 1941, it surpassed the previous high in 1929. But, on the whole, the study is a valuable bit of documentary evidence describing early impacts of war on a local labor market.

Dale Yoder

Regional War Labor Board, Chicago

Financing Small Corporations in Five Manufacturing Industries, 1926–36, by Charles L. Merwin. New York: National Bureau of Economic Research. 1942. xvi, 172 pp. $1.50.

Under its Financial Research Program, the National Bureau is sponsoring a series of studies in Business Financing designed "to trace from business accounting records the structural and cyclical changes that have occurred in the financial organization of business enterprise since the turn of the present century." Dr. Merwin's monograph constitutes the initial volume in this series.

The study is based on a sample of about 1200 small corporations (defined as those with assets of less than $250,000) in five industries—baking, men's clothing, furniture, stone and clay products, and machine tools—characterized by small enterprises and representative of diverse types of production (producers' goods, and perishable, semi-durable and durable consumers'

goods). Since relatively few small companies publish financial statements, the basic material needed for the study could be found only in federal income tax returns. The sample companies were selected from the income tax files of 1926 and 1930 and the returns of the same companies were then pulled for each successive year until 1936, or, in the event of discontinuance prior to that year, through the last year for which a return was filed. The laborious and costly task of assembling these returns and tabulating data from them had already been performed for a report of the Department of Commerce to the Temporary National Economic Committee (published as Monograph 15) on *Financial Characteristics of American Manufacturing Corporations*, of which Dr. Merwin is also the author. The present volume is based on a more detailed analysis of this unique compilation of financial data than time permitted him to make for the T.N.E.C. report.

The monograph deals mainly with three aspects of the financial experience of small companies: their profitability, the sources of their funds, and trends in their credit ratios as portents of discontinuance. The principal conclusions reached on these matters are briefly as follows:

(1) The return on the capital invested in small corporations is generally meagre. But their profitability, unlike that of large companies, cannot be measured simply by this standard. The owners of small corporations are as a rule also the managing officers, and part or all of their compensation must be included in net income if the earning power of small corporations is to be realistically appraised.

(2) Small companies incur very little long term debt but depend for their financing chiefly on equity capital from inside sources and on short term borrowing (accounts and notes payable).

(3) The approaching collapse of small companies is reflected in their financial structure for a number of years before their formal discontinuance. Growing weakness in the companies which failed during the period surveyed (over half of those included in the sample) was generally revealed by downturns in the ratios of net working capital to total assets, current assets to current liabilities, and net worth to total debt.

There is, of course, nothing novel in these conclusions. They are familiar and accepted generalizations. But by providing a much firmer statistical support for them than has hitherto been available, the author has done a very useful piece of work. He has handled his basic data carefully and taken pains to point out their limitations.

In view of the relatively narrow scope of the study, he has not attempted to prognosticate from it the future of small business in the United States. He does, however, conclude that long-term credits are ill-adapted to the needs of small corporations and that they must continue to depend for their financing mainly on inside equity capital and short-term credits.

WILLIAM H. WYNNE

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War Production Board

Taxing to Prevent Inflation, by Carl Shoup, Milton Friedman and Ruth P. Mack. New York: Columbia University Press. 1943. xii, 236 pp. $2.75.

The four essays in this brief volume represent the results of an inquiry into various techniques, which may be serviceable in devising quantitative measurements of the inflationary gap, and the revenue requirement necessary to close it. The authors are concerned in this study "exclusively with the kind of inflation that threatens to arise from the discrepancy between consumer incomes and the volume of goods and services available."

Various short-cut methods, which have been used to indicate the inflationary gap, are criticized as inadequate and even dangerous, since they are apparently too simple in their approach. But it is questionable whether much of practical usefulness is gained by evolving a detailed technique of measuring the inflationary gap. Deficiencies in factual data alone limit the applicability of the suggested techniques to making any final estimates of tax needs.

Part I presents an analysis of the many dependent as well as independent variables, such as assumed changes in total output, consumer spending, diversion of resources, net capital formation, instalment buying, voluntary saving, speculation, export balance, and similar items, all of which have a bearing on the size of the inflationary gap. Piecemeal quantitative estimates are made of these inter-related factors, and alternative sets of assumptions concerning increases in total output, defense spending, and diversions are tabulated.

Part III begins with a categorical statement that inflation has its genesis in an increased volume of spending by consumers, business, and government. But neither here nor elsewhere in the study is adequate consideration given to the possible effects of alternative sources of increased consumer spending power which bears so directly on the creation of the inflationary gap. The quantitative measurements of the various items considered and their interrelationships are apt to vary considerably, depending on whether additional spending power during the various stages in the conversion of the economy to a total war footing takes the form of fiat money or of expansion of bank credit.

While much of the detailed analysis of techniques for measuring inflation is rather involved—and at times difficult to follow partly because of the complex array of alternative possibilities presented and the many variables considered—the discussion of taxes available to avert inflation is distinctly clarifying and illuminating. The advantages and disadvantages of a retail sales tax over a personal net income tax, with stoppage at the source, are ably explored. The merits of a retail sales tax designed to reduce consumer spending power generated by war production are clearly recognized. But it is emphasized that any endorsement of such retail sales tax as a war measure, seeking to hold down price inflation, implies no preference for a sales tax as a normal part of a peacetime fiscal program.

Part IV, which deals with the effects of price changes upon production,

spending, and saving from one period to another, is dotted with a certain amount of figurative language, which lends a salutary literary flavor to an otherwise highly technical discussion. The following excerpts are typical:

"The forecaster must learn the weight of the mooring and the length of the mooring chain and must attempt to predict the movement of the wind and current in order that he may surmise how the floated markers will shift."

"A brief enumeration of them [evaluations and judgments] will provide a scaffolding sufficient to support the skilled climber likely to venture into the rarified atmosphere of these pages."

Having ploughed through the pages of the volume meticulously, one can agree with the author of Part IV that "as the margins narrow the mud becomes less sticky, the road hardens and the spirit of enterprise can ride again."

KARL SCHOLZ

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Belgian Banking and Banking Theory, by B. S. Chlepner. Washington: The Brookings Institution. 1943. x, 224 pp. $2.50.

Professor Chlepner is a foremost authority on Belgian banking, and it is to the credit of the Brookings Institution to have made available in English, if only in a short compass, the results of his research. The first three chapters of this very readable little book offer a concise history of banking in Belgium, enlivened by international comparisons. The following three chapters deal with governmental policy, especially with the banking reform since 1934, and with public credit institutions. Four chapters of a theoretical nature, with applications to Belgian banking history, conclude the text, supplemented by a short bibliography.

Professor Chlepner analyzes banking legislation after the great crisis in realistic terms: how it actually operated, and how little it meant in changing the practice of banking, contrary to legislative intentions. These chapters (on policy) are, in the reviewer's opinion, the most worth-while contribution of the book. Its historical section is the best available presentation of the subject, but it is far from being fully satisfactory. One might have wished, e.g., to learn some details of a factual nature about the intimate inter-connection of finance and industry in Belgium. The role of Belgian banks in the international money markets—at times a very important one—is almost entirely ignored. The unsatisfactory treatment of such significant aspects of Belgian banking may have to do with the fact that their discussion cannot be based on statistics and other publications, while the author's approach to banking history is on the whole that of the academic observer who had little direct acquaintance with the actual functioning of the credit machinery. He offers little insight into it other than by inference from statistical and similar material.

This lack of an "inside" understanding of the banking procedure expresses

itself in the liquidity-theories of the author. Dr. Chlepner emphasizes that Belgian banks operated on a meager cash liquidity ratio and with a disproportionately small volume of self-liquidating "discounts" as compared to industrial loans, and draws hasty conclusions along lines identical to H. G. Moulton's well-known approach. He overlooks, however, that Belgian banks could permit themselves low cash ratios because they could rely on British, French and Dutch institutions and on capitalistic groups with substantial gold holdings, a fact that did not appear in the statistics. He also overlooks the fact that the liquidity of an earning asset is not determined by the technical form in which it is dressed. In Belgium, as elsewhere, "loans" were different from "discounts" often only in the legal form. Again, the meager statistical data give no clue. They have actually misled the author into false generalizations, which in turn obscure his outlook on business cycles and on the role "mixed" banks of the Continental type play in the cyclical upheavals.

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PUBLICATIONS RECEIVED*

Benedict, Ruth, and Gene Weltfish. *The Races of Mankind.* New York: Public Affairs Committee, Inc. 1943. 31 pp. 10 cents.

Brown, Benjamin H. *The Tariff Reform Movement in Great Britain, 1881–1895.* New York: Columbia University Press. 1943. x, 170 pp. $2.50.

Chase, Stuart. *Where's the Money Coming From?: Problems of Postwar Finance.* New York: The Twentieth Century Fund. 1943. ix, 179 pp. $1.00.

Ford, Robert S. and Marvin A. Bacon. *Michigan Highway Finance.* Ann Arbor: University of Michigan Press, Michigan Governmental Studies No. 12. 1943. viii, 191 pp. 75 cents.

Hall, Ray Ovid. *Handbook of Tabular Presentation.* New York: The Ronald Press Company. 1943. viii, 112 pp. $3.50.

Hamburger, L. *How Nazi Germany Has Controlled Business.* Washington: The Brookings Institution. 1943. 101 pp. $1.00.

Kulischer, Eugene M. *The Displacement of Population in Europe.* Montreal: International Labour Office. 1943. iv, 171 pp. $1.50.

League of Nations. *Agricultural Production in Continental Europe during the 1914–18 War and the Reconstruction Period.* New York: Columbia University Press. 1943. 122 pp. $1.75.

Lorwin, Lewis L. *Postwar Plans of the United Nations.* New York: The Twentieth Century Fund. 1943. xii, 307 pp. $2.50.

May, George O. *Financial Accounting, A Distillation of Experience.* New York: The Macmillan Company. 1943. ix, 274 pp. $3.00.

Neiswanger, William A. *Elementary Statistical Methods.* New York: The Macmillan Company. xviii, 740 pp. $4.00.

Nicholls, W. H., and John A. Vieg. *Wartime Government in Operation.* Philadelphia: The Blakiston Company. 1943. xiii, 109 pp. $1.50.

Papier, Rose L. *Unemployment Compensation Experience of Beneficiaries in Columbus, Ohio: 1939–1940.* Columbus: The Ohio State University, The Bureau of Business Research. 1943. xiii, 82 pp. $1.50.

Riegel, John W. *Paving the Way for an Incentive Plan.* Pasadena: California Institute of Technology. 1943. 18 pp.

Slichter, Sumner H. *Present Savings and Postwar Markets.* New York: McGraw-Hill Book Company, Inc. 1943. iv, 73 pp. $1.00.

Spahr, Walter E. *Allied Military Currency, Some Queries and Observations.* New York: Economists' National Committee on Monetary Policy. 1943. 30 pp.

Stettinius, E. R., Jr. *Lend-Lease Weapon for Victory.* New York: The Macmillan Company. 1943. xiv, 358 pp. $3.00.

Whittlesey, Charles R. *The Effect of War on Currency and Deposits.* New York: National Bureau of Economic Research, *Our Economy in War,* Occasional Paper 11. 1943. 50 pp. 35 cents.

Government Publications

International Labour Office. *The Health of Children in Occupied Europe.* Montreal: International Labour Office. 1943. 37 pp. 25 cents.

Thompson, Warren S., and P. K. Whelpton. *Estimates of Future Population of the United States, 1940–2000.* Washington: Superintendent of Documents, U. S. Government Printing Office, National Resources Planning Board. 1943. 137 pp. 35 cents.

* Annual reports and publications presenting statistics collected at regular intervals have been omitted from this list. Some items of minor interest to statisticians have also been omitted. The contents of periodical publications are not listed, but the attention of the reader is directed to the lists of articles in current publications which are to be found in the *Revue de l'Institut International de Statistique, Journal of the Royal Statistical Society, American Economic Review, Population Index, Transactions of the Actuarial Society of America, The Record of the American Institute of Actuaries,* and *Sankhyā The Indian Journal of Statistics.*—Editor.